

A D - 752 050

**CHEMICAL MILLING**

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November 1972

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**AD- 752 050**

# **CHEMICAL MILLING**

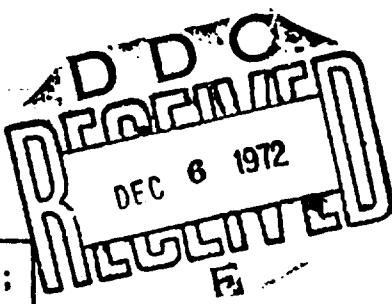
## **A DDC BIBLIOGRAPHY**

**DDC-TAS-72-60**

**NOVEMBER 1972**

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Security Classification

**DOCUMENT CONTROL DATA - R & D**

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) <b>DEFENSE DOCUMENTATION CENTER Cameron Station Alexandria, Virginia 22314</b>	2a. REPORT SECURITY CLASSIFICATION <b>UNCLASSIFIED</b>
2. REPORT TITLE <b>CHEMICAL MILLING</b>	2b. GROUP

4. DESCRIPTIVE NOTES (Type of report and inclusive dates) <b>Bibliography (August 1957 - January 1972)</b>
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5. AUTHOR(S) (First name, middle initial, last name)
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6. REPORT DATE <b>November 1972</b>	7a. TOTAL NO. OF PAGES <b>160</b>	7b. NO. OF REFS <b>104</b>
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8. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)
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9. PROJECT NO.  <b>DDC-TAS~72-60</b>	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)  <b>AD-752 050</b>
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10. DISTRIBUTION STATEMENT  <b>Approved for public release; distribution unlimited</b>
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11. SUPPLEMENTARY NOTES  <b>Superseded AD-702 750</b>	12. SPONSORING MILITARY ACTIVITY
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13. ABSTRACT
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This report includes references on the capabilities and limitations of Chemical Milling Techniques, materials for which it is suitable, and the quality of the finished surfaces.

Corporate Author-Monitoring Agency, Subject, Title, Personal Author, Contract Number and Report Number Indexes are provided.

DD FORM 1473  
1 NOV 68

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Security Classification

1a

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Security Classification

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
*Bibliographies *Chemical Milling Etching Titanium Alloys Aluminum Alloys Stainless Steel Electrolytes Beryllium Alloys Metallography Machining Material Removal Transistors Manufacturing Methods Nickel Alloys Reagents Cobalt Alloys Precision Finishing Crystals Copper Alloys Tin Alloys Zinc Alloys Refractory Metals Printed Circuits						

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August 1957 - January 1972

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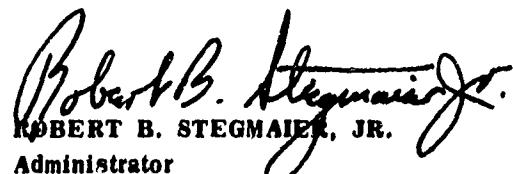
## FOR E W O R D

This bibliography is a compilation of references on *Chemical Milling*. Entries were selected, using the authorized term chemical milling, from references processed into the AD data banks from January 1953 to July 1972 and supersedes AD-702 750.

Corporate Author-Monitoring Agency, Subject, Title, Personal Author, Contract Number and Report Number Indexes are provided.

**BY ORDER OF THE DIRECTOR, DEFENSE SUPPLY AGENCY**

**OFFICIAL**

  
ROBERT B. STEGMAIER, JR.  
Administrator  
Defense Documentation Center

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REPORT NUMBER.....	R-1

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UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-252 129  
WATERVLIET ARSENAL N Y

CHEMICAL MILLING

(U)

DEC 60 23P ROSE, C.H.  
REPT. NO. WVT RI 60001 IRI 60001 I

UNCLASSIFIED REPORT

DESCRIPTORS: \*CHEMICAL MILLING, ALLOYS, ALUMINUM ALLOYS,  
CASTING, CHEMICAL REACTIONS, CORROSION, GUNS, MACHINE  
TOOLS, MACHINING, MAGNESIUM ALLOYS, MANUFACTURING  
METHODS, MECHANICAL PROPERTIES, METALS, PHYSICAL  
PROPERTIES, PRECISION FINISHING, PROCESSING, PRODUCTION,  
SHEETS, STEEL, SURFACE PROPERTIES, TEMPLATES, TITANIUM  
ALLOYS

(U)

A PROCESS STUDY, OUTLINING THE CAPABILITIES AND  
LIMITATIONS OF CHEMICAL MILLING, THE MATERIALS FOR  
WHICH IT IS SUITABLE, THE ACCURACIES AND SURFACE  
FINISHES EXPECTED; DERIVED FROM A STUDY OF THE  
AVAILABLE LITERATURE AND VISITS TO USERS OF THE  
PROCESS, ARE MADE TO DETERMINE THE APPLICABILITY OF  
THE METHOD TO THE PILOT PRODUCTION REQUIREMENTS OF  
WATERVLIET ARSENAL. FORTY-TWO POUNDS OF 4340  
STEEL WERE REMOVED FROM A 90MM M41 BREECH RING IN  
61 HOURS BY CHEMICAL MILLING. SURFACE FINISH WAS .62  
MICRINOCHES. METAL REMOVAL RATE WAS .0007 IN. PER  
MINUTE. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-256 351

PENNSYLVANIA STATE UNIV UNIVERSITY PARK

INFLUENCE OF DISPLACIVE-SHEARING STRESSES ON THE  
KINETICS OF RECONSTRUCTIVE TRANSFORMATIONS EFFECTED  
BY PRESSURE IN THE RANGE 0-100,000 BARS (U)

IV DACHILLE,FRANK;ROY,RUSTUMI

UNCLASSIFIED REPORT

DESCRIPTORS: \*CHEMICAL MILLING, \*PHASE STUDIES,  
\*TRANSFORMATIONS, CHEMICAL BONDS, CHEMICAL ENGINEERING,  
PRESSURE, REACTION KINETICS, SHEAR STRESSES,  
TEMPERATURE (U)

EARLIER RESULTS SHOWED THAT ORDINARY LABORATORY  
GRINDERS AND MIXERS WERE ABLE TO CONVERT SEVERAL  
PHASES (E.G. PbO<sub>2</sub>, MnF<sub>2</sub>, CaCO<sub>3</sub>,  
BeF<sub>2</sub>, ETC.) INTO THEIR RESPECTIVE HIGH-PRESSURE  
FORMS WHICH, AT EQUILIBRIUM REQUIRE 10-15,000  
ATMOSPHERES AT ROOM TEMPERATURE. HENCE, EXPERIMENTS  
WERE DEVISED TO ATTEMPT TO SEPARATE THE EFFECT OF  
HYDROSTATIC PRESSURE FROM THOSE OF SHEARING STRESSES  
AND BOND-BREAKAGE. A STUDY OF THE INFLUENCE OF  
SHEARING STRESSES SUPERIMPOSED UPON QUASIHYDROSTATIC  
PRESSURES OF UP TO 100,000 BARS AT TEMPERATURES BELOW  
550 C WAS MADE POSSIBLE BY THE DEVELOPMENT OF  
SIMPLE APPARATUS. THIS CONSISTS OF THE BRIDGMAN  
UNIAXIAL-TYPE APPARATUS, WITH A PROVISION FOR  
CONTINUOUS ROTATION OF THE BOTTOM PISTON VERY SLOWLY  
BACK AND FORTH THROUGH A 2 DEGREE ARC. THE SAMPLE  
IS HEATED EXTERNALLY; DISPLACIVE-SHEARING RUNS WITH  
PRESSURE AND TEMPERATURE AUTOMATICALLY CONTROLLED CAN  
BE MADE FOR PERIODS EXCEEDING SEVERAL DAYS IF  
DESIRED. THE RESULTS CLEARLY SEPARATE THE INFLUENCE  
OF HYDROSTATIC PRESSURE ITSELF UPON REACTION RATES  
FROM THE EFFECT OF THE ADDED DISPLACIVE-SHEARING  
STRESSES. FROM THE RESULTS IT BECOMES CLEAR THAT  
EQUILIBRIUM RELATIONS BETWEEN PHASES ARE NOT ALTERED  
BY THE SHEARING STRESSES. (AUTH.JR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-261 959  
AEROJET-GENERAL CORP SACRAMENTO CALIF

STRUCTURAL TESTS OF A CHEMICALLY MILLED LADISH D-6AC  
STEEL SECOND-STAGE MINUTEMAN AFT CLOSURE (U)

JUL 61 1V THOMAS, R.W.;  
CONTRACT: AF33 600 36610

UNCLASSIFIED REPORT

DESCRIPTORS: \*CHEMICAL MILLING, \*ROCKET CASES,  
DEFORMATION, DESIGN, GUIDED MISSILES, HYDROSTATIC  
PRESSURE, MEASUREMENT, MECHANICAL PROPERTIES,  
PROCESSING, ROCKET MOTORS, STAGING, STEEL, STRESSES,  
SURFACE-TO-SURFACE, TESTS (U)  
IDENTIFIERS: MINUTEMAN (U)

A STUDY WAS MADE TO DETERMINE IF THE STRUCTURAL  
STRENGTH REQUIREMENTS FOR THE AFT CLOSURE OF THE  
SECOND-STAGE MINUTEMAN ENGINE COULD BE MET WITH  
REDUCED-WEIGHT, CHEMICALLY MILLED CLOSURE OF LADISH  
D-6AC STEEL. THE STUDY INDICATED THAT THE  
CHEMICALLY MILLED AFT CLOSURE, WHICH WEIGHED 60 LB  
LESS THAN THE CONVENTIONAL STEEL CLOSURE, HAD  
SATISFACTORY STRUCTURAL STRENGTH. THE STRUCTURAL  
TESTS WERE MADE WITH AN AFT CLOSURE OF THE  
PRELIMINARY FLIGHT RATING TEST (PFRT)  
DESIGN. THE CLOSURE WAS CHEMICALLY-MILLED TWICE TO  
REDUCE THE THICKNESS OF PART OF THE SHELL, THE NOZZLE  
BOSSES, AND THE BOLTED JOINT. STRESSCOAT WAS  
APPLIED TO THE AFT CLOSURE AND THE UNIT WAS  
HYDROSTATICALLY TESTED AFTER EACH MILLING OPERATION.  
AN ANALYSIS OF STRESS AND STRAIN DATA INDICATED  
THAT THE REDUCED-WEIGHT CLOSURE SATISFACTORILY  
WITHSTOOD A PRESSURE OF 600 PSIG AND WILL MEET  
ULTIMATE STRENGTH DESIGN CRITERIA. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZGML6

AD-262 184

NORTHROP AIRCRAFT INC HAWTHORNE CALIF

DEVELOPMENT OF IMPROVED METHODS, PROCESSES, AND  
TECHNIQUES FOR PRODUCING STEEL EXTRUSIONS

(U)

JUN 61 IV CHRISTENSEN, L.M. & ROSEN, W.I.  
REPT. NO. NOR 61 199  
CONTRACT: AF33 600 36713

UNCLASSIFIED REPORT

DESCRIPTORS: \*AIRFRAMES, \*EXTRUSION, \*STEEL, CHEMICAL  
MILLING, CORROSION-RESISTANT ALLOYS, DIES, DIFFUSION,  
DRAWING (MACHINE PROCESSING), GLASS, HARDNESS, HEAT  
TREATMENT, LUBRICANTS, MANUFACTURING METHODS, MECHANICAL  
PROPERTIES, MICROSTRUCTURE, NICKEL, PLATING, PROCESSING,  
SURFACE PROPERTIES, TENSILE PROPERTIES

(U)

IDENTIFIERS: 8-70 AIRCRAFT

(U)

DIMENSIONAL INTEGRITY AND SURFACE QUALITIES  
OBTAINED IN THE 0.06-IN. TEE SECTIONS OF PHASE  
I ARE CONSIDERED SUFFICIENT FOR PROCEEDING TO  
PHASE II. LOW AND ERRATIC MECHANICAL  
PROPERTIES WERE NOTED IN THE EVALUATION OF PHASE  
I EXTRUSIONS IN BOTH H-11 AND PH 15-7MO  
MATERIALS. METALLURGICAL STUDIES INDICATED THAT  
THESE LOW PROPERTIES RESULTED FROM DIFFUSION OF THE  
NICKEL LUBRICANT MATERIAL INTO THE SURFACE OF THE  
EXTRUSIONS. AFTER REMOVAL OF THE CONTAMINANT  
COATING BY CHEMICAL ETCHING, THE RESULTANT MECHANICAL  
PROPERTIES WERE WELL WITHIN SPECIFICATIONS FOR THE  
MATERIALS. THE CHEMICAL ETCHING ALSO YIELDS  
IMPROVED SURFACE QUALITY. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-264 685

GENERAL DYNAMICS/CONVAIR SAN DIEGO CALIF

TITANIUM DEVELOPMENT PROGRAM. VOLUME IV.

(U)

MAY 61 IV LANGLOIS, A.P.; MURPHY, J.F.; GREEN, G.

E.D.:

CONTRACT: AF33 600 34876

MONITOR: ASD TR617 576

UNCLASSIFIED REPORT

DESCRIPTORS: \*ALLOYS, \*JOINTS, \*MANUFACTURING METHODS,  
\*TITANIUM ALLOYS, AIRPLANE ENGINE DUCTS, AIRPLANE  
PANELS, ALUMINUM ALLOYS, BOLTED JOINTS, BRAZING,  
CHEMICAL MILLING, CONFIGURATION, DESIGN, FUSELAGES, HEAT  
TREATMENT, MATERIALS, MOLYBDENUM ALLOYS, PROCESSING,  
RIVETED JOINTS, SMALL TOOLS, SPOT WELDS, STIFFENED  
CYLINDERS, TAILS (AIRCRAFT), TORPEDO COMPONENTS,  
VANADIUM ALLOYS, WELDING, WELDS, WINGS

(U)

CONTENTS: MANUFACTURING METHOD DEVELOPMENT  
DEVELOPMENT OF OPTIM M OPERATIONAL SEQUENCING  
PROCESS DEVELOPMENT CHEMICAL MILLING  
TOOLING CONCEPTS ROOM TEMPERATURE FORM -  
FURNACE HOT SIZE AND AGE ROOM TEMPERATURE  
FORM - HEATED PRESS HOT SIZE - FURNACE AGE  
SHORT CYCLE HOT FORM - AGE SEQUENCE TOOL  
MATERIALS PARTS MANUFACTURE TAIL CONE  
LEADING EDGE CANTED FUSELAGE BULKHEAD  
ASSEMBLIES ENGINE BLEED AIR DUCTS PANELS

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-265 701

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

ELECTRIC AND CHEMICO-MECHANICAL METHODS OF WORKING  
METALS (CHAPTER VII) (U)

IV POPOLOV, L. YA.:

UNCLASSIFIED REPORT

DESCRIPTIONS: •METALS, •PROCESSING, BRAZING, CHEMICAL  
MILLING, ELECTRODEPOSITION, ELECTROEROSIVE MACHINING,  
ELECTROLYTIC POLISHING, ELECTROPLATING, HEAT TREATMENT,  
HEATING, PICKLING, SINTERING, SOLDERING, SPARK  
MACHINING, TECHNOLOGICAL INTELLIGENCE, TRANSLATIONS (U)

IDENTIFIERS: USSR (U)

ELECTROCHEMICAL METHODS OF ELECTROPLATING AND  
ELECTROCHEMICAL POLISHING ARE DEMONSTRATED.  
CHEMICAL MILLING AND METAL HEATING PROCESSES ARE  
DISCUSSED. HEAT TREATING OF STEEL BY CONTACT  
ELECTROHEATING (N. V. GEVELING'S METHOD), HEATING  
IN ELECTROLYTES (I. Z. YASNOGOODSKIY'S METHOD),  
AND SURFACE FLAME HARDENING ARE ALSO DISCUSSED. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-267 806  
METAL HYDRIDES INC BEVERLY MASS

DEC 61 IV  
CONTRACT: DA91 591EUC1722

UNCLASSIFIED REPORT

DESCRIPTORS: \*COPPER, ACETIC ACIDS, CADMIUM, CHEMICAL MILLING, CHLORIDES, CRYSTALLIZATION, DISKS, FEASIBILITY STUDIES, HEATING, IRON COMPOUNDS, MELTING, NITRIC ACID, PHOSPHORIC ACIDS, PRODUCTION, SHEETS, SINGLE CRYSTALS, SPACE NAVIGATION, TEST METHODS (U)

A METHOD WAS DEVELOPED FOR PRODUCING A STACK OF CU SINGLE CRYSTAL DISKS 50-MICRONS THICK WHICH UTILIZED THE SPAR PLANNING TECHNIQUE FOLLOWED BY CHEMICAL POLISHING. THE METHOD FOR PROCESSING 35- TO 50-MICRON THICK DISKS IS AS FOLLOWS: (1) GROW 2.5-MM THICK SLABS AS BIG AS POSSIBLE, (2) SPARK-TEPAN 1-CM DIAM DISCS AND SPARK PLANE TO 75 TO 100 MICRONS THICK, AND (3) CHEMICALLY THIN TO 35 TO 50 MICRONS. ATTEMPTS TO GROW SINGLE CRYSTAL Cd DISKS RESULTED IN THE FORMATION OF POLYCRYSTALLINE SHEETS. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-268 033

AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD  
MASS

A NOTE ON SEMICONDUCTOR DEVICE FABRICATION

(U)

AUG 61 1V BERMAN, I.:  
REPT. NO. 729

UNCLASSIFIED REPORT

DESCRIPTORS: ALLOYS, BONDING, CHEMICAL MILLING,  
ELECTROEROSIVE MACHINING, GERMANIUM COMPOUNDS, HEATING,  
IMPURITIES, INTERMETALLIC COMPOUNDS, PICKLING  
COMPOSITIONS, PLATING, PRODUCTION, SEMICONDUCTORS,  
SILICON COMPOUNDS, TEST METHODS (U)

A DISCUSSION IS PRESENTED OF THE BASIC STEPS IN THE  
MAKING OF GE AND SI JUNCTION DEVICES. IT  
INCLUDES A LIST OF THE COMMON ETCHANTS WITH THEIR  
RELATION TO VARIOUS PHASES OF DEVICE FABRICATION.  
CONSIDERATION IS GIVEN TO ALLOYING FOR JUNCTIONS  
AND OHMIC CONTACTS, AS WELL AS INFORMATION ON  
APPLYING THE DOPANT ALLOY. ELECTROLESS NI OR  
AU GOLD, FURNACE FIRING, AND PLATING ARE EXAMINED  
IN VIEW OF REQUIRED MODIFICATIONS. (AUTHOR) (U)

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AD-269 209

BATTELLE MEMORIAL INST COLUMBUS OHIO DEFENSE METALS  
INFORMATION CENTER

A REVIEW OF RECENT DEVELOPMENTS IN TITANIUM AND  
TITANIUM ALLOY TECHNOLOGY

(U)

DEC 61 IV WOOD, R.A.  
REPT. NO. M144

UNCLASSIFIED REPORT

DESCRIPTORS: \*METALLURGY, \*SHEETS, \*TITANIUM ALLOYS,  
AIR, ANTOXIDANTS, CHEMICAL MILLING, COATINGS,  
CONTAMINATION, CORROSION INHIBITION, EXTRUSION, GASES,  
HIGH-TEMPERATURE RESEARCH, IGNITION, IMPURITIES,  
MANUFACTURING METHODS, MECHANICAL PROPERTIES, OXIDATION,  
PROCESSING

(U)

A STUDY OF THE AIR CONTAMINATION AND PROTECTION FOR  
4 DOD TI SHEET ALLOYS INDICATED THAT TI-  
4AL3MO-IV AND TI-6AL-4V HAD ABOUT EQUAL  
RESISTANCE TO PENETRATION BY INTERSTITIAL  
CONTAMINANTS. THE HARDNESS PENETRATION TESTS  
SHOWED TI-13V11CR-3AL AND TI-2.5AL-16V  
ALLOYS HAD LOWER RESISTANCE TO CONTAMINATION IN THAT  
ORDER. THE TI-5AL-2.5SN, TI-6AL-4V,  
AND TI-13V-11CR-3AL ALLOYS WERE EVALUATED  
FOR SUSCEPTIBILITY TO H EMBRITTLEMENT INDUCED BY  
CHEMICALLY MILLING IN A HYDROFLUORIC ACID BATH.  
THE ALL-ALPHA TI-5AL2.5SN ALLOY WAS NOT  
EMBRITTLED. THE TI-6AL-4V ALLOY WAS ONLY  
SLIGHTLY EMBRITTLED, WHILE THE TI-13V-11CR-  
3AL ALLOY WAS SEVERELY EMBRITTLED. AN  
INVESTIGATION CONCERNING THE TITANIUM-LOX REACTION  
WAS CONDUCTED BY USING HIGH-PRESSURE GASEOUS O.  
THE STUDY ESTABLISHED THAT A FRESH TI SURFACE  
WOULD REACT WITH GASEOUS O UNDER ABOUT 100-PSIG  
PRESSURE BETWEEN ~250 F AND ROOM TEMPERATURE.  
SEVERAL METHODS OF PRODUCING FLAT SOLUTION-TREATED  
TITANIUM ALLOY SHEET ARE REVIEWED AND A NEW CONCEPT  
IS DESCRIBED. BASICALLY, THE NEW METHOD INVOLVES  
HEATING AND COOLING THE SHEET UNDER TENSION.

(AUTHOR)

(U)

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AD-271 167  
BOEING CO WICHITA KANS WICHITA DIV

BOEING-WICHITA MATERIALS AND RESEARCH DEVELOPMENT  
PROGRAMS, 1957-1961

(U)

SEP 61 IV POE,A.H.;SHIGLEY,H.E.  
CONTRACT: AF33 616 8141

UNCLASSIFIED REPORT

DESCRIPTORS: \*AIRFRAMES; \*MATERIALS, \*RADOMES,  
ADHESIVES, ALLOYS, ALUMINUM, BONDING, BRAZING, CADMIUM,  
CERAMIC COATINGS, CERAMIC MATERIALS, CHEMICAL MILLING,  
COMPOSITE MATERIALS, HEAT-RESISTANT PLASTICS, HIGH-  
TEMPERATURE RESEARCH, IGNITION, JET ENGINE FUELS,  
LAMINATES, LUBRICANTS, MACHINING, MANGANESE, METAL  
JOINTS, METALS, ORGANIC COATINGS, PLASTICS, PLATING,  
POLYMERS, STAINLESS STEEL, TEXTILES, TITANIUM,  
VARNISHES

(U)

CONTENTS: IRON AND STEEL: AM 350 STAINLESS  
STEEL, CHEMICAL ETCHING; LIGHT METALS AND ALLOYS:  
TI FASTENERS (6AL-4V); VACUUM PLATED AL,  
CORROSION RESISTANCE OF VARIOUS ALUMINUMS; HEAVY  
NON-FERROUS METALS AND ALLOYS: VACUUM PLATED Cd,  
ELECTROPLATED Mn; PLASTICS: METAL BONDING  
MATERIALS, ADHESIVES, PARAPLAST 33, EPOXY TUBING,  
3M-471 PLASTIC TAPE, EPOXY MAT MOLD DIE; LIQUID  
AND SEMI-SOLID HIGH POLYMERS: ADHESIVES, HIGH  
TEMPERATURE LUBRICANTS, ENAMELS AND LACQUERS, EPOXY  
ORGANIC COATINGS, NEOPRENE ORGANIC COATING; FIBROUS  
AND FILAMENTARY MATERIALS: INVESTIGATION OF  
FABRICS FOR LINT FREE CONDITION; COMPOSITE  
MATERIALS: CERAMIC BRAZE, EPON 828 AND 143 GLASS  
FABRIC LAMINATES, 181 VSLAN AND 181-A-1100 SILANE  
FINISH FABRIC, REINFORCED LASTICS FOR RADOMES,  
DECALS.

(U)

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UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-271 536

DOUGLAS AIRCRAFT CO INC LONG BEACH CALIF

CHEMICAL COMPOUNDS FOR METAL SHAPING

(U)

JAN 62 IV JAMIESON, J. L.; LOCKHART, F. J.;  
CONTRACT: AF33 600 43027  
MONITOR: ASD TR7 648 VI

UNCLASSIFIED REPORT

DESCRIPTORS: \*ALLOYS, \*CHEMICAL MILLING, \*METALS,  
\*REFRACTORY MATERIALS, AIRCRAFT, ALUMINUM ALLOYS,  
CARBOXYMETHYLCELLULOSE, CHEMICALS, CHROMIUM ALLOYS,  
GELS, HEAT RESISTANT METALS + ALLOYS, MATERIALS,  
MOLYBDENUM ALLOYS, NICKEL ALLOYS, NIOBIUM, POROUS  
MATERIALS, PROCESSING, PRODUCTION, SOLIDS, SOLUTIONS,  
STAINLESS STEEL, STEEL, STRUCTURES, TANTALUM, TITANIUM  
ALLOYS, VANADIUM ALLOYS (U)

SEVERAL GEL SYSTEMS WERE PREPARED WITH ACID  
SOLUTIONS SUSPENDED IN A GEL MATRIX OF ORGANIC, WATER  
SOLUBLE RESINS. THESE GEL ETCHANTS CAN BE CAST  
INTO SEMIRIGID SHAPES AND ARE STABLE AT TEMPERATURES  
UP TO 140 TO 160 F. IN CONTACT WITH A STEEL  
SURFACE, THE GEL ETCHANTS CHEMICALLY REACT AND REMOVE  
METAL AT A CONTROLLED RATE. THE REACTION PRODUCTS  
AND REACTANTS MIGRATE COUNTERCURRENTLY THROUGH THE  
GEL MEDIA. FURTHER DEVELOPMENT AND TESTING WILL  
DETERMINE APPLICABILITY AS NON-LIQUID ETCHANTS.

(AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-271 965

METAL HYDRIDES INC BEVERLY MASS

INVESTIGATION OF SINGLE-CRYSTAL AND POLYCRYSTALLINE  
TITANIUM DIBORIDE: METALLOGRAPHIC PROCEDURES AND  
FINDINGS

(U)

NOV 61 1V LYNCH,C.T.;VAHLDIEK,F.W.;  
MONITOR: ASD TR61 350

UNCLASSIFIED REPORT

DESCRIPTORS: \*BORIDES, \*CRYSTALS, \*SINGLE CRYSTALS,  
\*TITANIUM COMPOUNDS, ABRASIVES, CHEMICAL MILLING,  
CRYSTAL STRUCTURE, ELECTROLYtic POLISHING, GRINDERS,  
GRINDING WHEELS, HIGH-TEMPERATURE RESEARCH, PREPARATIONS,  
PROCESSING, REFRACTORY MATERIALS, SPECTROGRAPHIC  
ANALYSIS

(U)

SINGLE-CRYSTAL AND POLYCRYSTALLINE TIB<sub>2</sub> WAS  
EXAMINED TO DEVELOP APPLICABLE METALLOGRAPHIC  
TECHNIQUES FOR SECTIONING, MOUNTING, GRINDING,  
POLISHING, AND ETCHING OF TIB<sub>2</sub> SPECIMENS. THIS  
WORK DEMONSTRATES THE USABILITY AND PRACTICABILITY OF  
USING VARIOUS SIC PAPERS TOGETHER WITH DIFFERENT  
GRADES OF DIAMOND PASTE ON POLISHING WHEELS IN  
PREFERENCE TO USING CLOTHS. IT HAS BEEN FOUND THAT  
H<sub>2</sub>SO<sub>4</sub>, AS A CONSTITUENT OF ETCHANTS, PRODUCES  
MORE RELIABLE AND MORE CONSISTENT RESULTS THAN HF.  
THE SAME IS TRUE OF H<sub>2</sub>SO<sub>4</sub> WHEN USED AS A  
CONSTITUENT OF ELECTROLYTES. SINGLE-CRYSTAL  
TIB<sub>2</sub> WAS FOUND TO HAVE A TYPE OF WIDMANSTATTEN  
STRUCTURE WHILE POLYCRYSTALLINE TIB<sub>2</sub> HAD A  
NEEDLE-LIKE PATTERN. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOMLG

AD-272 227

GENERAL DYNAMICS/FORT WORTH TEX

MATERIALS - HONEYCOMB CORE RIBBON RELATIONSHIP  
BETWEEN FLOW CHARACTERISTICS OF BRAZING ALLOY AND  
OXIDE FILM FORMATIONS OF - DETERMINATION OF (U)

JAN 62 IV PRATT, W.M.;  
REPT. NO. FGT 2510  
CONTRACT: AF33 600 36200

UNCLASSIFIED REPORT

DESCRIPTORS: \*BRAZING, \*HONEYCOMB CORES, \*SANDWICH  
PANELS, \*STAINLESS STEEL, ALLOYS, CHEMICAL MILLING,  
CLEANING, CONTROLLED ATMOSPHERES, COPPER ALLOYS,  
ELECTRON DIFFRACTION ANALYSIS, FILMS, HEAT TREATMENT,  
HYDROGEN, LITHIUM ALLOYS, OXIDES, PROCESSING, SILVER  
ALLOYS, SPECTROGRAPHIC ANALYSIS, SURFACE PROPERTIES,  
SURFACES, ULTRASONIC RADIATION (U)

BRAZING FLOW TESTS WERE RUN ON 17-7PH .0015  
IN. THICK STAINLESS STEEL SPECIMENS, USING THE 92.8-7-  
C.2 AG-CU-LI BRAZING ALLOY.  
SPECTROPHOTOMETRIC MEASUREMENTS, ELECTRON  
DIFFRACTION STUDIES, AND FERRIC CHLORIDE ETCH TESTS  
REVEALED DIFFERENCES IN COLOR AND REFLECTANCE,  
COMPOSITION, THICKNESS, PHYSICAL CHARACTERISTICS, AND  
ETCHING OF THE SURFACES OF SPECIMENS HAVING A  
DIFFERENT ANNEALING HISTORY. FLOW RESPONSE OF 17-  
7PH FOIL UNDER CONDITIONS OF CAPILLARITY CAN BE  
DETERMINED BY A SANDWICH FLOW TEST. WHEN THE  
MATERIAL WAS ANNEALED IN A HYDROGEN ATMOSPHERE OF  
VERY LOW DEW POINT (-85 F), VERY GOOD ALLOY FLOW  
WAS OBTAINED UPON BRAZING UNDER CAPILLARY CONDITIONS  
OF THE SANDWICH FLOW TEST. LIMITED SANDWICH FLOW  
TESTING OF THE ULTRASONICALLY CLEANED SPECIMENS GAVE  
EXCELLENT IMPROVEMENT IN BRAZING RESPONSE FOR DEW  
POINTS RANGING FROM -30 TO 41 F. AD- 72 2 9  
RESPONSE OF 17-7PH FOIL UNDER CONDITIONS OF  
CAPILLARITY CAN BE DETERMINED BY A SANDWICH FLOW  
TEST. WHEN THE MATERIAL WAS ANNEALED IN A HYDROGEN  
ATMOSPHERE OF VERY LOW DEW POINT (-85 F), VERY  
GOOD ALLOY FLOW WAS OBTAINED UPON BRAZING UNDER  
CAPILLARY CONDITIONS OF THE SANDWICH FLOW TEST.  
LIMITED SANDWICH FLOW TESTING OF THE ULTRASONICALLY  
CLEANED SPECIMENS GAVE EXCELLENT IMPROVEMENT IN  
BRAZING RESPONSE FOR DEW POINTS RANGING FROM -30 TO  
41 F. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-272 526  
MCDONNELL AIRCRAFT CORP ST LOUIS MO

MOLYBDENUM STRUCTURAL COMPONENT PROGRAM

(U)

FEB 62 12P  
CONTRACT: N0W-61-0653

UNCLASSIFIED REPORT

DESCRIPTORS: \*COATINGS, \*MOLYBDENUM ALLOYS, \*RIVETS,  
AIRFRAMES, ALUMINUM COATINGS, ANTI-OXIDANTS, BOLTED  
JOINTS, BOLTS, CHEMICAL MILLING, CHROMIUM COMPOUNDS,  
COMPATIBILITY, COMPOSITE MATERIALS, DESIGN, FORGING,  
HIGH-TEMPERATURE RESEARCH, LOCKING FASTENER DEVICES,  
METAL COATINGS, METAL JOINTS, MOLYBDENUM, NIOBIUM,  
REFRACTORY COATINGS, RIVETED JOINTS, SILICON COATINGS,  
SPACESHIPS, STRUCTURES, TEMPLATES, TITANIUM ALLOYS,  
ZIRCONIUM ALLOYS

(U)

PROGRESS IS REPORTED ON THE MO STRUCTURAL  
COMPONENTS. COATING VENDORS WERE INTERVIEWED TO  
DETERMINE THE MOST ECONOMICAL DESIGN AND ASSEMBLY  
PROCEDURE FOR THE RUDDER FROM A COATING STANDPOINT.  
COMPATIBILITY STUDIES OF MO-COATED AND NB-  
COATED PARTS WERE COMPLETED. PRE-PRODUCTION MO  
MATERIAL WHICH COULD BE USED FOR PRELIMINARY  
EVALUATION WAS SELECTED FOR ROLLING FOR THE DETAIL  
FABRICATION EVALUATION. THE RUDDER FITTINGS CANNOT  
BE MADE AS MO OR NB FORGINGS UNDER  
WESTINGHOUSE OR CRUCIBLE STEELS STUDY PROGRAM.  
THE BLANKING OF MO PARTS BY CHEM-MILLING WAS  
INVESTIGATED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-276 887

ALLOY ENGINEERING AND CASTING CO CHAMPAIGN ILL

A FUNDAMENTAL STUDY OF ROLLING CONTACT FATIGUE (U)

MAY 62 1OP KIRSHENBAUM, N.W. I  
CONTRACT: NOW-61-0656

UNCLASSIFIED REPORT

DESCRIPTORS: \*CRYSTALS, \*FATIGUE (MECHANICS),  
\*FLUORIDES, \*LITHIUM COMPOUNDS, CHEMICAL MILLING,  
ELECTRON BEAMS, HEAT TREATMENT, PHYSICAL PROPERTIES,  
PICKLING, PROCESSING, RADIATION EFFECTS, ROLLING MILL(U)

CHEMICAL POLISHING OF LIF CRYSTALS USING HBF4  
WAS UNSATISFACTORY. POLISHING UNANNEALED  
IRRADIATED CRYSTALS IN AGITATED SOLUTIONS OF 2 TO  
5% NH4OH WAS PROMISING. AN AQUEOUS SOLUTION  
OF  $1.5 \times 10^{-4}$  M FEF3 WAS  
SUPERIOR TO FECL3 AS AN ETCHANT MEDIUM.  
CLEAVAGE OF LIF CRYSTALS AT LIQUID N  
TEMPERATURE APPARENTLY DECREASED BRITTLENESS.  
CLEAVED CRYSTALS ANNEALED BETWEEN 350 AND 500 C  
SHOWED EVIDENCE OF THERMAL ETCHING. HIGH VOLTAGE  
ELECTRON IRRADIATION OF LIF CRYSTALS PRODUCED  
ATOMISTIC EFFECTS SIMILAR TO GAMMA IRRADIATION;  
IRRADIATED CRYSTALS WERE CLEAVED WITH LESS EFFORT  
AND DEFORMATION THAN THE AS-RECEIVED CRYSTALS. A  
TECHNIQUE FOR OBSERVING DISLOCATIONS INTRODUCED BY  
ROLLING WAS DEVISED.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-278 526

AERONCA MFG CORP MIDDLETOWN OHIO

BERYLLIUM COMPOSITE STRUCTURES. VOLUME II. MATERIALS  
AND PROCESSES

(U)

MAY 62 IV KRUSOS, J.N.; KJELBY, A.S. &  
REPT. NO. TR61 706 V2  
CONTRACT: AF33 616 7050  
MONITOR: ASD TR61 706 V2

UNCLASSIFIED REPORT

DESCRIPTORS: AEROSPACE CRAFT, ALLOYS, ALUMINUM  
COMPOUNDS, BRAZING, CERAMIC MATERIALS, CHEMICAL MILLING,  
DIOXIDES, FOAMS, FOILS, HEAT SHIELDS, HIGH-TEMPERATURE  
RESEARCH, HONEYCOMB CORES, MANUFACTURING METHODS, METAL  
PLATES, OSRD, OXIDES, REINFORCING MATERIALS, SHEETS,  
SHIELDING, SILICON COMPOUNDS, STAINLESS STEEL, TESTS,  
THERMAL INSULATION, ZIRCONIUM COMPOUNDS (U)

THE METHODS DEVELOPED FOR FABRICATION OF BE SHEET  
COMPOSITE STRUCTURES ARE DESCRIBED. DESCRIPTIONS  
AND PERFORMANCE EVALUATION ARE INCLUDED FOR A VARIETY  
OF PANELS FABRICATED UNDER THE CONTRACT CONSISTING OF  
BE LOAD BEARING PANELS AND POROUS CERAMIC HEAT  
SHIELDS DEVELOPED TO WITHSTAND TEMPERATURES IN EXCESS  
OF 3000 F. CONCEPTS ARE OUTLINED DEFINING  
APPLICATION OF BE-CERAMIC COMPOSITES TO AEROSPACE  
VEHICLE STRUCTURES. BE SHEET FABRICATION METHODS  
AND TOOLING ARE DESCRIBED AND INCLUDE SUCH PROCESSES  
AS CUTTING, FORMING, CHEM-MILLING, AND BRAZING. BE  
SHEET FACES WERE BRAZED TO A VARIETY OF SUPERALLOY  
AND STAINLESS STEEL HONEYCOMB CORES. THREE BASIC  
POROUS CERAMIC FOAMS WERE DEVELOPED IN THE HEAT  
SHIELD: AL2O3, ZRO2, AND SIO2.

(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-281 843  
HARRY DIAMOND LABS WASHINGTON D C

MICROCIRCUITRY BY CHEMICAL DEPOSITION. (U)

JUN 62 47P HEBB,EMMA LEE :  
REPT. NO. TR-1052  
PROJ: 96392

UNCLASSIFIED REPORT

DESCRIPTORS: \*CIRCUITS, \*METAL FILMS,  
\*MICROMINIATURIZATION (ELECTRONICS), \*RESISTORS,  
\*SUBMINIATURE ELECTRONIC EQUIPMENT, CHEMICAL MILLING,  
COPPER, FILMS, MANUFACTURING METHODS, NICKEL, NICKEL  
ALLOYS, PHOSPHORUS ALLOYS, PLATING (U)

IDENTIFIERS: THIN FILMS, THIN FILMS  
ELECTRONICS (M)

TECHNIQUES FOR CHEMICALLY DEPOSITING NI ALLOY  
FILMS ON INSULATING SUBSTRATES AND FOR ETCHING  
PATTERNS IN THIN CU CONDUCTORS, WERE COMBINED AND  
MODIFIED TO PERMIT THE FABRICATION OF NI ALLOY THIN  
FILMS IN VARIED AND CONTROLLED GEOMETRIES. THE  
RESISTIVITIES OF THE FILMS PRODUCED WERE VARIED FROM  
A FEW OHMS PER SQUARE TO SEVERAL THOUSAND OHMS PER  
SQUARE, BUT, AT PRESENT, TOLERANCES ON  
REPRODUCIBILITY LIMIT THE WORKING RANGE TO A MAXIMUM  
OF ABOUT 500 OHMS PER SQUARE. RESISTIVE AND  
CONDUCTIVE PARTS MADE OF NICKEL ALLOY FILMS OF  
APPROXIMATELY 500 OHMS PER SQUARE HAVE BEEN EMPLOYED  
IN MICROCIRCUITS IN WHICH THE TOLERANCES ON  
RESISTANCE VALUES ARE ABOUT + OR - 30%.  
ALTHOUGH VARIATIONS IN FILMS RESISTIVITY BETWEEN  
BATCHES SOMETIMES EXCEEDS THESE TOLERANCES, THE CLOSE  
AGREEMENT AMONG FILMS FROM THE SAME BATCH AND THE  
ABILITY TO MEASURE RESISTIVITIES PRIOR TO COMMITTING  
FILMS TO CIRCUIT PRODUCTION ALLOWED SUCH CIRCUITS TO  
BE FABRICATED. MODIFICATIONS OF PROCEDURES TO  
INCREASE THE REPRODUCIBILITY OF RESISTANCE VALUES ARE  
BEING INVESTIGATED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-282 U17

MARTIN CO BALTIMORE MD

THE EFFECT OF SURFACE-ACTIVE AGENTS ON THE MECHANICAL PROPERTIES OF METALS. PART II. THE EFFECT OF SURFACE-ACTIVE AGENTS ON THE MECHANICAL BEHAVIOR OF ALUMINUM SINGLE CRYSTALS. (U)

DESCRIPTIVE NOTE: REPT. FOR JAN 60-JAN 61, ON RESEARCH ON NEW CHEMICAL SYSTEMS AND METHODS OF SYNTHESIS.

APR 61 20P

CONTRACT: AF33 616 6220.

PROJ: 7023

MONITOR: WADD TR-61-58-PT-2

UNCLASSIFIED REPORT

DESCRIPTORS: (\*METALLIC CRYSTALS), (\*SINGLE CRYSTALS), SURFACE PROPERTIES, SHEAR STRESSES, WETTING AGENTS, STEARIC ACIDS, METALLIC SOAPS, ADSORPTION, MECHANICAL PROPERTIES, CHEMICAL MILLING, ALUMINUM (U)

SINGLE CRYSTALS OF AL WERE PULLED IN TENSION IN A SOLUTION OF PARAFFIN OIL AND STEARIC ACID. THE CRITICAL RESOLVED SHEAR STRESS DID NOT CHANGE WITH THE CONCENTRATION OF THE STEARIC ACID SOLUTION; HOWEVER, THE EXTENT AND SLOPES OF STAGES I AND II WERE AFFECTED GREATLY. THE OBSERVATIONS LEND EVIDENCE THAT THE WEAKENING EFFECT OF SURFACE-ACTIVE AGENTS IS CONTROLLED BY THE RATE OF DESORPTION OF THE METAL SOAP FORMED BY THE REACTION OF THE SURFACE-ACTIVE AGENT AND THE METAL SURFACE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-282 920  
DOUGLAS AIRCRAFT CO. INC LONG BEACH CALIF

CHEMICAL COMPOUNDS FOR METAL SHAPING

(U)

NOV 61 IV CADY, J.R., & JAMIESON, J.L.  
REPT. NO. 1111  
CONTRACT: AF19 604 4556  
MONITOR: AFCRL 1111

UNCLASSIFIED REPORT

DESCRIPTORS: \*CHEMICAL MILLING, \*GELS, \*METALS,  
\*STAINLESS STEEL, ACETAES, ACIDS, AIRCRAFT, ALLOYS,  
CARBOXYLIC ACIDS, CELLULOSE ACETATES, CHEMICAL  
PROPERTIES, CHEMICALS, CHLORIDES, COLLOIDS, HONEYCOMB  
CORES, IRON COMPOUNDS, MATERIALS, MECHANICAL PROPERTIES,  
METAL PLATES, METHANES (I C), METHYL RADICALS, MOLDING,  
PLASTICS, POROUS MATERIALS, PROCESSING, REAGENTS,  
SOLIDS, SOLUTIONS, SURFACES, TESTS, VINYL RADICAL (U)

FURTHER DEVELOPMENT OF GEL SYSTEMS HAS IMPROVED  
PHYSICAL, CHEMICAL AND MECHANICAL PROPERTIES.  
MILLING METAL PLATE STOCK IS LIMITED BY THE AMOUNT  
OF CHEMICAL ENERGY PRESENTLY AVAILABLE IN THE GEL.  
STAINLESS STEEL HONEYCOMB WAS CHEMICALLY CONTOURED  
WITH GOOD DIMENSIONAL CONTROL. POROUS SOLIDS  
CARRYING LIQUID ETCHANTS FORMED PROFILE CUTS, BUT  
TOLERANCE AND SURFACE FINISH NEED IMPROVEMENT.  
COMPARATIVE TESTS WITH LIQUID AND NON-LIQUID  
ETCHANTS DETERMINED PROBABLE LIMITS OF PERFORMANCE.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-285 085

ALLOY ENGINEERING AND CASTING CO CHAMPAIGN ILL

A FUNDAMENTAL STUDY OF ROLLING CONTACT FATIGUE (U)

AUG 62 17P MORDON, M.J.;  
CONTRACT: N0W-61-0656

UNCLASSIFIED REPORT

DESCRIPTORS: \*DEFORMATION, \*FATIGUE (MECHANICS),  
\*LITHIUM COMPOUNDS, CHEMICAL MILLING, CRYSTAL LATTICE  
DEFECTS, CRYSTALS; ETHYLENES, FLUORIDES, FRICTION,  
LOADING, NYLON, POLYMERS, PREPARATION, ROLLING MILLS,  
SINGLE CRYSTALS, SPHERES, STRESSES, SURFACES (U)

SPHERES OF NYLON AND TEFLON MATERIAL WERE  
ROLLED AT CONSTANT SPEED OVER A (001) SURFACE OF  
CAREFULLY PREPARED CRYSTALS OF LiF UNDER APPLIED  
LOADS RANGING FROM 1 TO 400 GMS. IN THE ROLLING  
CONTACT APPARATUS, UNDER THE IMPACT OF THE  
APPLIED LOAD, A NARROW DEFORMATION TRACK, REVEALED BY  
A HIGH DISLOCATION ETCH PIT DENSITY, WAS LEFT IN THE  
WAKE OF THE ROLLING SPHERE. WITHIN THE TRACK,  
ETCH PITS WERE CLUSTERED IN LOCALIZED AREAS PROBABLY  
CAUSED BY SUBMICROSCOPIC ASPERITIES IN THE SURFACES  
OF CONTACT. ORTHOGONAL (110) SLIP BANDS WERE  
GENERALLY OBSERVED TO BE ALIGNED PARALLEL AND NORMAL  
TO THE ROLLING DIRECTION AT MODERATE STRESS LEVELS;  
HOWEVER, AT HIGHER STRESSES, THE TWO OTHER AVAILABLE  
SLIP SYSTEMS WERE ALSO OBSERVED. THE EXPERIMENTAL  
LOAD DATA ARE GENERALLY IN GOOD AGREEMENT WITH  
THEORETICAL CONSIDERATIONS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-266 U74

GENERAL DYNAMICS/FORT WORTH TEX

WING - ALUMINUM SHEET AND PLATE - DYNAMIC ETCHED OR  
CHEM-MILLED - MECHANICAL PROPERTIES - DETERMINATION  
OF

(U)

SEP. 62 IV FARNER, H.B.  
REPT. NO. FGT 2100  
CONTRACT: AF33 600 32841

UNCLASSIFIED REPORT

DESCRIPTORS: \*ALUMINUM ALLOYS, \*CHEMICAL MILLING,  
FATIGUE (MECHANICS), MECHANICAL PROPERTIES, METAL  
PLATES, PROCESSING, SHEETS, SURFACES, TENSILE  
PROPERTIES, TEST METHODS, THICKNESS  
IDENTIFIERS: 7075 T ALUMINUM ALLOYS

(U)

(U)

THE EFFECT OF CHEMICAL MILLING ON MECHANICAL  
PROPERTIES OF 2024, 7075, 7079 AL ALLOYS WAS  
DETERMINED. THE TENSILE STRENGTHS WERE AFFECTED AS  
FOLLOWS: ALL THE 0.064 IN. GAGE 2024-T86 ALCLAD  
ALUMINUM SHOWED STRENGTH LOSSES. BARE 1.50 IN.  
GAGE 7075-T6 AND 7079-T6 ALUMINUM PLATE, SHOWED  
STRENGTHS APPROXIMATELY 10% BELOW THE STRENGTH OF  
THE CONTROL SPECIMENS. THERE WAS NO SIGNIFICANT  
CHANGE IN THE MECHANICAL PROPERTIES WHEN THE .125  
IN. THICK ALCLAD 2024-T86 WAS REDUCED TO 0.098 IN.  
THICKNESS, THE 0.312 IN. THICK 2024-T86 AND 7075-  
T6 WERE REDUCED TO 0.098 IN. THICKNESS; THE 1-1/2  
IN. THICK 7075-T6 WAS REDUCED TO 0.030 IN.  
THICKNESS, OR THE 1-1/2 IN. THICK 7079-T6 IN THE  
LONGITUDINAL DIRECTION WAS REDUCED TO 0.030 IN.  
THICKNESS. THE 7079-T6 IN THE TRANSVERSE DIRECTI  
N SHOWED A LOSS IN YIELD STRENGTH OF ABOUT 10%.  
THE 0.312 IN. THICK 2024-T86 PLATE REDUCE TO  
0.015 IN. THICKNESS, SHOWED A LOSS OF APPROXIMATELY  
6% IN YIELD AND ULTIMATE STRENGTHS IN THE  
TRANSVERSE DIRECTION. GENERALLY, ALL THE MATERIALS  
SHOWED SOME LOSS OF DUCTILITY. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-286 872

GENERAL MOTORS CORP KOKOMO IND DELCO RADIO DIV

PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION  
TECHNIQUES AND INCREASE THE RELIABILITY OF THE  
2N1358A TRANSISTOR

(U)

JUL 62 JV KUHN, J-C-1  
CONTRACT: DA36 039SC86725

UNCLASSIFIED REPORT

DESCRIPTORS: \*MANUFACTURING METHODS, \*TRANSISTORS,  
CHEMICAL MILLING, CRYSTALS, ELECTRIC CURRENTS,  
GERMANIUM, GROWTH, INDIUM ALLOYS, LIFE EXPECTANCY,  
MATERIALS, PROCESSING, RELIABILITY, SEMICONDUCTORS,  
TEMPERATURE, TEST EQUIPMENT, TEST METHODS, THERMAL  
STRESSES

(U)

EFFORTS WERE MADE TO IMPROVE THE RELIABILITY OF  
2N1358A TRANSISTORS BY IMPROVEMENT OF  
MANUFACTURING TECHNIQUES INCLUDING EQUIPMENT AND  
PROCESS MODIFICATIONS, RELIABILITY TESTS, FAILURE  
ANALYSIS AND ANALYTICAL-EMPIRICAL SURFACE STUDIES.  
THE WAFER FLASH-ETCH WAS INCORPORATED IN THE ALLOY  
AREA TO MINIMIZE THE TIME BETWEEN ETCH AND ALLOY.  
ALL OF THE GERMANIUM WAFERS FOR 2N1358 TYPE  
TRANSISTORS ARE CURRENTLY BEING SLICED BY THE  
INTERNAL SAWING METHOD. THE MAJOR RELIABILITY  
PROBLEMS ARE DEGRADATION OF THE COLLECTOR DIODE DUE  
TO SURFACE CONTAMINATION; Emitter Diode Degradation  
Due To Surface Defects; And High Floating Potential  
Due To Fracturing Of Spur Regrowth At The Collector  
Periphery. The Residual Gas Analysis Has  
Indicated On All Units Tested The Presence Of Water  
Vapor (Possibly Adsorbed) Beyond What Was Expected  
In View Of The Baking And Dry Air Capping Procedure  
In Production. This, In Conjunction With  
Indications Of Adsorbed Gas In Nickel Plated Parts,  
And The Results Of Bake-Out Recovery Techniques On  
Degraded Collector Diodes, Provides Clues And  
Suggests Experiments To Determine Corrective Action  
For The Collector Diode Degradation Problem.  
UTHOR) AD-286 8729N2 +++THE RELIABILITY OF  
THE 2N1358A TRANSISTOR BY IMPROVEMENT OF  
MANUFACTURING TECHNIQUES INCLUDING EQUIPMENT AND  
PROCESS MODIFICATIONS, RELIABILITY TEST, FAILURE  
ANALYSIS AND ANALYTICAL-EMPIRICAL SURFACE STUDY.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-285 886

GENERAL ELECTRIC CO SCHENECTADY N Y

SILICON PLANAR EPITAXIAL TRANSISTOR TYPE 2N2193 (U)

JUL 62 JV JOHNSON,S.O.I

CONTRACT: DA36 039SC86727

UNCLASSIFIED REPORT

DESCRIPTORS: TRANSISTORS, ALLOYS, ALUMINUM ALLOYS,  
BORON COMPOUNDS, CHEMICAL MILLING, DIFFUSION, ELECTRIC  
POTENTIAL, ELECTRODES, EVAPORATION, FAILURE (MECHANICS),  
GASES, HEATING, HUMIDITY, HYDROGEN, INFRARED LAMPS, LIFE  
EXPECTANCY, MANUFACTURING METHODS, MATERIALS, NITROGEN,  
PHOSPHORUS, PROCESSING, RELIABILITY, SEMICONDUCTORS,  
SILICON, TEMPERATURE, TESTS, THERMAL STRESSES, TRANSONIC  
CHARACTERISTICS, VIBRATION (U)

CONTENTS: IMPROVED KPR RESOLUTION CONTACT  
EVAPORATION AND ALLOYING COLLECTOR ETCHING BORON  
DIFFUSION PHOSPHORUS DIFFUSION COLL. CTOR CONTACT  
TO THE HEAD R INTERCO ECTIONS RELIABILITY MEASUR  
ME T FAILURE A ALYSIS (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-286 907

PHILCO CORP LANSDALE PA

PEM FOR TRANSISTOR MANUFACTURING PROCESS  
IMPROVEMENT

(U)

JUL 62 IV. SANDERS, J.;  
REPT. NO. R 232 1  
CONTRACT: DA36 039SC86720

UNCLASSIFIED REPORT

DESCRIPTORS: (\*TRANSISTORS), (\*MANUFACTURING  
METHODS), RELIABILITY, STRESSES, STORAGE,  
OPERATION, ENCAPSULATION, ELECTRODES,  
TEMPERATURE, SEALS(STOPPERS), DEGASIFICATION,  
CHEMICAL MILLING, HIGH-TEMPERATURE RESEARCH,  
PRODUCTION

(M)

A PRODUCTION ENGINEERING MEASURE WAS STUDIED FOR  
IMPROVEMENT OF PRODUCTION TECHNIQUES TO INCREASE THE  
RELIABILITY FOR THE JET ETCH TRANSISTOR TYPE  
2N501A, WITH A MAXIMUM OPERATING FAILURE RATE OF  
0.01% PER 1000 HOURS AT A 90% CONFIDENCE LEVEL AT  
25 C AS AN OBJECTIVE. EFFORTS WERE MADE TO  
IMPROVE THE FOLLOWING SEVEN MANUFACTURING PROCESSES:  
(1) PLATING EDGE DEFINITION, (2) HIGHER  
TEMPERATURE ALLOYS, (3) LEAD ATTACHMENTS  
(INCLUDES COLLECTOR ATTACHMENTS), (4)  
CONTROLLED FORMATION OF SURFACE OXIDES FOR SURFACE  
STABILIZATION, (5) GETTERING TECHNIQUES FOR  
ENCAPSULATING AND SEALING, (6) THERMAL  
DISSIPATION OF PACKAGE, AND (7) LEAK  
DETERMINATION. ESTABLISHMENT OF A PILOT LINE TO  
INCORPORATE THESE PROCESS IMPROVEMENTS IS REPORTED.  
PRELIMINARY OPERATING STRESS DATA ON TRANSISTORS  
FABRICATED ON THE PILOT LINE INDICATES AN  
IMPROVEMENT IN POWER HANDLING CAPABILITY AS A RESULT  
OF THE PROCESS IMPROVEMENTS COMPLETED. PROBLEMS  
ASSOCIATED WITH OPERATING STRESS TESTING AND WITH  
OBTAINING CORRELATION BETWEEN OPERATING STRESS  
TESTING AND STORAGE STRESS TESTING ARE DISCUSSED.

(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-287 594  
IIT RESEARCH INST CHICAGO ILL

FIBER-REINFORCED METALS AND ALLOYS

(U)

OCT 62 6P PARikh,N.M.1  
REPT. NO. B241 3  
CONTRACT: N0W-62-0650

UNCLASSIFIED REPORT

DESCRIPTORS: \*COMPOSITE MATERIALS, \*METALS, \*REINFORCING MATERIALS, ALLOYS, ALUMINUM ALLOYS, BERYLLIUM, CHEMICAL MILLING, FIBERS, FLUORIDES, GERMANIUM, GERMANIUM ALLOYS, HYDROGEN COMPOUNDS, MELTING, METALLIC TEXTILES, MICROSTRUCTURE, NITRIC ACID, POWDER METALS, SOLIDS, WIRE

(U)

BE FIBER-AG ALLOY MATRIX COMPOSITES WERE PREPARED FROM 0.0047 IN DIAM WIRES. ALTHOUGH THERE IS AN ETCHING EFFECT ON THE WIRE SURFACES DUE TO THE HIGH PROCESSING TEMPERATURES, THE BOND BETWEEN BE FIBER SURFACE AND AG MATRIX IS A COHERENT ONE. POWDERS WERE PREPARED BY METING AND ATOMIZATION. HE AL ALLOY MATRIX WS USED FOR PREPARING SOME EXTRUDED BARS FOR DETERMINING THE OPTIMUM HEAT TREATMENT CONDITIONS. ALL THESE COMPOSITES ARE BEING EVALUATED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-291 600

TEXAS INSTRUMENTS INC DALLAS

SILICON SEMICONDUCTOR NETWORKS MANUFACTURING  
METHODS

(U)

NOV 62 IV LATHROP, J.W.; BROWER, W.C.;  
REPT. NO. IR7 865 V6  
CONTRACT: AF33 600 42210  
MONITOR: ASD IR7 865 V6

UNCLASSIFIED REPORT

DESCRIPTORS: \*SEMICONDUCTORS, \*SILICON, \*SUBMINIATURE  
ELECTRONIC EQUIPMENT, BONDING, BRAZING, CHEMICAL  
MILLING, CIRCUITS, CONTAINERS, DESIGN, DIFFUSION,  
ELECTRON BEAMS, EVAPORATION, FILMS, GLASS, GROWTH, LEAD  
MATERIALS, MATHEMATICAL ANALYSIS, PROCESSING,  
PRODUCTION, SWITCHING CIRCUITS, TEST EQUIPMENT, TEST  
METHODS, VAPOR PLATING, WELDING

(U)

PROCESS STUDIES WERE CONCLUDED. TECHNIQUES HAVE  
BEEN DEVELOPED FOR EVALUATION OF ALL DIFFUSION  
PARAMETERS. ALL MACHINES FOR THE PILOT LINE ARE  
EITHER COMPLETED, BEING CONSTRUCTED OR MODIFIED, OR  
IN ADVANCED DESIGN STAGE. THE PHILOSOPHY GUIDING  
CREATION OF THESE MACHINES IS THAT ALL POSSIBLE  
OPERATIONS WILL BE PERFORMED ON THE FUNCTIONAL  
ELECTRONIC BLOCKS WHILE THEY ARE STILL IN SLICE FORM.  
THESE OPERATIONS INCLUDE CLEANING, POLISHING,  
PHOTORESIST APPLICATIONS, ETCHING, DIFFUSION, AND  
APPLICATION OF EVAPORATED LEADS AND CONTACTS.  
CONSIDERABLE PROGRESS HAS BEEN MADE TOWARD  
PERFECTING A WELDED PACKAGE. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-291 876

PHOTOCIRCUITS CORP GLEN COVE N Y

MICROMINIATURE LAYERED PRINTED WIRING

(U)

SEP 62 IV MESSNER, G.; MCCAW, R.; PALUSZEK, M.;  
CONTRACT: DA-36-009-SC-90763

UNCLASSIFIED REPORT

DESCRIPTORS: \*MANUFACTURING METHODS,  
\*MICROMINIATURIZATION (ELECTRONICS), \*PRINTED CIRCUITS,  
CHEMICAL MILLING, COPPER, GELS, LAMINATES, METAL FILMS,  
PHOTOENGRAVING, PICTURES, PLATING, SANDWICH PANELS (U)

SPRAY ETCHING FOR PRODUCING THIN LINES, AND LAMINATING  
TECHNIQUES FOR MULTILAYER PRINTED CIRCUITS IN A  
MICROMINIATURIZATION PROGRAM.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-293 259

IIT RESEARCH INST CHICAGO ILL

FIBER-REINFORCED METALS AND ALLOYS

(U)

JAN 63 IUP PARIKH,N.M.;  
REPT. NO. 8241 4  
CONTRACT: N04-62-0650

UNCLASSIFIED REPORT

DESCRIPTORS: •COMPOSITE MATERIALS, •FIBERS, •METALS,  
•REINFORCING MATERIALS, ALLOYS, ALUMINUM ALLOYS,  
ATMOSPHERIC PRECIPITATION, BERYLLIUM ALLOYS, CARBIDES,  
CHEMICAL MILLING, CHEMICAL PRECIPITATION, EXTRUSION,  
GRAIN STRUCTURES (METALLURGY), HEAT TREATMENT, IRON  
ALLOYS, MICROSTRUCTURE, POWDER METALLURGY, POWDER  
METALS, PROCESSING, PRODUCTION, SILVER, SINTERING,  
TUNGSTEN ALLOYS, WIRE

(U)

WORK WAS CONTINUED ON THE CHEMICAL ETCHING OF RAWN  
BE WIRES TO REDUCE THEIR DIAMETERS FROM 0.0047 TO  
ABOUT 0.001 INCH. SEVERAL MATRIX ALLOYS WERE  
PREPARED BY ATOMIZING. THESE WERE PREPARED BY  
FIRST MELTING 2S AL IN A CRUCIBLE, ADDING THE  
ALLOYING ELEMENTS TO THE MELT, AND DISINTEGRATING THE  
MOLTEN STREAM OF METAL OF ABOUT 100 PSI PRESSURE OF  
DRY COMPRESSED AIR. THE POWDERS THUS COLLECTED  
WERE SIEVED THROUGH A 60 MESH SCREEN AND COMPACTED IN  
A 1-INCH DIE. IN THE WORK ON BE FIBER COMPOSITES,  
THE SPREAD IN THE SIZE OF THE FIBERS WAS SO GREAT  
THAT IT WAS DIFFICULT TO DESIGNATE AN AVERAGE SIZE.  
THE FIBERS WERE MIXED WITH PLAIN 2S AL POWDER  
(-60 MESH), COMPACTED IN A 1-INCH DIE AT 15 TSI  
AND EXTRUDED AT TEMPERATURES BELOW 870F AT AN  
EXTRUSION RATIO OF ABOUT 40:1. THE TENSILE  
PROPERTIES AND ELASTIC MODULUS WERE MEASURED ON A  
HOUNSFIELD TENSIMETER. IT WAS A CHIEF OBJECTIVE  
OF THIS SERIES OF EXPERIMENTS TO SEE IF THESE  
COMPOSITES COULD BE DENSIFIED BY EXTRUSION TECHNIQUE  
, AND IT APPEARS THAT THIS TECHNIQUE IS SATISFACTORY.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-293 445

INNSBRUCK UNIV (AUSTRIA)

DISLOCATION MOBILITY IN ZINC SINGLE CRYSTALS (U)

DEC 62 IV ADAMS,K.H.;VREELAND,T. JR.;  
CONTRACT: N0NR22037

UNCLASSIFIED REPORT

DESCRIPTORS: \*DEFORMATION, \*SINGLE CRYSTALS, \*ZINC,  
CHEMICAL MILLING, CONFIGURATION, CRYSTAL LATTICE  
DEFECTS, DENSITY, LOADING, METALLIC CRYSTALS, SHEAR  
STRESSES, STRESSES, TEST METHODS (U)

RESULTS OF A STUDY OF DISLOCATION MOBILITY IN HIGH PURITY ZINC SINGLE CRYSTALS ARE PRESENTED.  
DISLOCATION POSITIONS WERE DETERMINED USING A SPECIAL ETCHING TECHNIQUE, AND THE DISLOCATION DENSITY AND CONFIGURATION WERE DETERMINED BEFORE AND AFTER STATIC LOADING AND SHORT PULSE LOADING. LOADING AT STRESS LEVELS SLIGHTLY BELOW THE FLOW STRESS PRODUCE LOCAL DISLOCATION ARRANGEMENT, WITH THE MAXIMUM DISLOCATION DISPLACEMENT SOMEWHAT LESS THAN THE SUB-BOUNDARY SPACING. AT THE FLOW STRESS DISLOCATIONS PENETRATE THE SUB-BOUNDARIES AND RELATIVELY LARGE DISLOCATION DISPLACEMENTS ARE INDICATED (COMPARABLE TO THE SPECIMEN DIMENSIONS) IN STRESS PULSE TESTS OF APPROXIMATELY 30 SEC DURATION. SHORT DURATION STRESS PULSE LOADING AT A STRESS LEVEL APPROXIMATELY 70 TIMES THE FLOW STRESS PRODUCED A MAXIMUM DISLOCATION VELOCITY OF APPROXIMATELY 6 PER CENT OF THE SHEAR WAVE VELOCITY.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO: /Z0ML6

AD-294 786

ARMY ELECTRONICS LABS FORT MONMOUTH N.J.

DESIGN CONSIDERATIONS FOR MICROWAVE GERMANIUM TUNNEL  
DIODES

(U)

SEP 62 BY WANDINGER,L. & KLOHN,K.  
REPT. NO. TR2318

UNCLASSIFIED REPORT

DESCRIPTORS: \*DIODES, \*MANUFACTURING METHODS,  
\*SEMICONDUCTORS, CHEMICAL MILLING, ELECTROFORMING,  
ENCAPSULATION, GERMANIUM, MEASUREMENT, MICROWAVE  
EQUIPMENT, NEGATIVE RESISTANCE CIRCUITS, PRODUCTION,  
RESISTANCE (ELECTRICAL), SURFACE PROPERTIES (U)

A DISCUSSION IS PRESENTED ON THE TECHNOLOGY AND  
PROBLEMS INVOLVED IN THE DESIGN CONSIDERATIONS,  
FABRICATION, AND MEASUREMENT OF GERMANIUM TUNNEL  
DIODES. FABRICATION INCLUDES MATERIAL PREPARATION,  
METHODS OF CREATING ABRUPT P-N JUNCTIONS SUCH AS DOT  
ALLUYING, ELECTRICAL FORMING OR PULSE DISCHARGE  
FORMING AND SOLUTION GROWTH, ETCHING PROCEDURES  
NECESSARY TO OBTAIN LOW PEAK CURRENTS AND HIGH PEAK  
TO VALLEY CURRENT RATIOS, AND PACKAGING  
CONSIDERATIONS FOR LOW SERIES INDUCTANCE.  
MEASUREMENT TECHNIQUES TO DETERMINE THE IMPORTANT  
HIGH-FREQUENCY PARAMETERS, RS, LS, C, AND RN, OF  
THE DIODE ARE DISCUSSED. THE RESULTS OF  
EXPERIMENTAL UNITS EXHIBITING CUTOFF FREQUENCIES UP  
TO 5 GC ARE TABULATED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO: /Z0ML6

AD-295 057  
SPRAGUE ELECTRIC CO NORTH ADAMS MASS

PRODUCTION ENGINEERING MEASURE RELIABILITY  
IMPROVEMENT JET ETCH TRANSISTOR

(U)

OCT 62 1V GAGNE, R. M.; KRANTZ, J. E.; FOLSTER,  
J. H. D.;

UNCLASSIFIED REPORT

DESCRIPTORS: \*MANUFACTURING METHODS, CHEMICAL MILLING,  
ELECTRICAL PROPERTIES, LIFE EXPECTANCY, PRODUCTION,  
RELIABILITY, TRANSISTORS

(U)

THE OPTIMUM COLLECTOR RESISTIVITY, THE OPTIMUM  
COLLECTOR THICKNESS, THE OPTIMUM ELECTRICAL  
BASEWIDTH, AND THE PROPER EMITTER PLACEMENT WERE  
DETERMINED. INVESTIGATIONS LEADING TO THESE  
DETERMINATIONS ARE DESCRIBED. WORK HAS CONTINUED  
TOWARD DEVISING A METHOD TO STOP AUTOMATICALLY THE  
DELINEATION ETCHING PROCESS AFTER THE COLLECTOR  
JUNCTION WAS DELINEATED. SOME PROGRESS WAS MADE IN  
THIS AREA, AND WORK IS CONTINUING. TWO NEW PROCESS  
STEPS WERE INTRODUCED AND DESCRIPTIONS OF THESE ARE  
ALSO GIVEN. THE STATUS OF THE PROGRAM, LIFE TEST  
RESULTS TO DATE, AND CURRENT FAILURE RATES ARE ALSO  
PRESENTED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-295 752

DOUGLAS AIRCRAFT CO INC LONG BEACH CALIF

CHEMICAL COMPOUNDS FOR METAL SHAPING (U)

JAN 63 IV JAMIESON, J. L.; PARTRIDGE, E. G. I

REPT. NO. TR7 648 V3

CONTRACT AF33 600 43027

MONITOR ASD TR7 648 V3

UNCLASSIFIED REPORT

DESCRIPTORS: HONEYCOMB CORES, \*STAINLESS STEEL, ACIDS,  
CARBOXYMETHYLCELLULOSE, CELLULOSE ACETATES, CHEMICAL  
MILLING, CHEMICALS, ELECTRIC CURRENTS, ELECTROCHEMISTRY,  
ELECTRODES, ELECTROLYTES, ELECTROLYTIC CELLS, GELS,  
METALS, POLARIZATION, POROUS MATERIALS, PROCESSING,  
REDUCTION, RESISTANCE (ELECTRICAL), SOLIDS, SOLUTIONS,  
THICKNESS (U)

ELECTROLYTIC ETCHING OF STAINLESS STEEL PLATES AND HONEYCOMB  
CORES; VARIOUS CHEMICAL COMPOUNDS USED FOR METAL  
SHAPING; PROCESSING OF AIRCRAFT MATERIALS.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-298 707

TEXAS INSTRUMENTS INC DALLAS

RESEARCH AND DEVELOPMENT OF HIGH TEMPERATURE  
SEMICONDUCTOR DEVICES

(U)

DEC 61 19 WURST, E.C. & PETRITZ, R.L.;  
CONTRACT: NOBSR85424.

UNCLASSIFIED REPORT

DESCRIPTORS: ARSENIDES, CHEMICAL MILLING, DIFFUSION,  
ENCAPSULATION, GALLIUM COMPOUNDS, GOLD ALLOYS,  
MAGNESIUM, MANUFACTURING METHODS, OXIDES, SILICON  
COMPOUNDS, TEMPERATURE, TESTS, TIN ALLOYS

(U)

GALLIUM ARSENIDE TRANSISTORS ARE FABRICATED AND  
TESTED AT 150 C. SEVERAL TECHNIQUES ARE INVESTIGATED,  
INCLUDING MAGNESIUM DIFFUSION IN GAAS AND THE  
FEASIBILITY OF SiO<sub>2</sub> COATINGS ON GAAS AS A MASK AGAINST  
IMPURITY DIFFUSION; POSTALLOY DIFFUSION AND CHEMICAL  
POLISHING.

33

UNCLASSIFIED

/Z0ML6

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-400 732  
PHOTOCIRCUITS CORP GLEN COVE N Y

MICROMINIATURE LAYERED PRINTED WIRING (U)

DEC 62 IV MESSNER, G.; MCCAW, R.; PALUSZEK, M.  
CONTRACT: DA-36-039-SC-90763

UNCLASSIFIED REPORT

DESCRIPTORS: CHEMICAL MILLING, CONFIGURATION, COPPER,  
DRILLING MACHINES, ELECTRIC CONNECTORS, ELECTRIC  
TERMINALS, EPOXY PLASTICS, GOLD, LAMINATED PLASTICS,  
LAMINATES, MANUFACTURING METHODS, METAL COATINGS,  
MICROMINIATURIZATION (ELECTRONICS), NICKEL, PANEL BOARDS  
(ELECTRICITY), PLATING, PRINTED CIRCUITS, PRODUCTION,  
SOLDERING (U)

PROCESS PARAMETERS FOR THE MANUFACTURE OF MICROMINIATURE  
LAYERED PRINTED WIRING WITH PLATED-THROUGH HOLES AS  
THE INTERCONNECTING LINK BETWEEN LAYERS.

34

UNCLASSIFIED

/Z0ML6

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-402 164

GENERAL DYNAMICS/POMONA CALIF

EFFECT OF SURFACE FINISHES ON FATIGUE LIFE

(U)

MAR '59 IV

W.E.: WINSLOW,E.K.,LINDENEAU,G.D.,WISE,

REPT. NU. 8926 142

CONTRACT: AF33 657 8926

UNCLASSIFIED REPORT

DESCRIPTORS: ALLOYS, ALUMINUM ALLOYS, CHEMICAL MILLING,  
COLD WORKING, DATA, EFFECTIVENESS, FATIGUE (MECHANICS),  
HEAT TREATMENT, LIFE EXPECTANCY, MACHINING, STEEL,  
STRESSES

IDENTIFIERS: 4340 STEEL

(U)

(U)

THE EFFECT OF SURFACE FINISHES PRODUCED BY CHEMICAL MILLING  
AND MICRO-GLASS-PEENING ON THE FATIGUE LIFE  
OF STEEL AND ALUMINUM ALLOYS.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-404 185

GENERAL ELECTRIC CO SCHENECTADY N Y

SILICON PLANAR EPITAXIAL TRANSISTOR 2N2193. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 3, 31 OCT 62-31  
JAN 63.

JAN 63 .1V

CONTRACT: DA36 039SC86727

UNCLASSIFIED REPORT

DESCRIPTORS: \*TRANSISTORS, VAPOR PLATING, VACUUM  
APPARATUS, SILICON, CHEMICAL MILLING, BONDING,  
CLEANING, ALLOYS, BORON, PHOSPHORUS,  
DIFFUSION, RELIABILITY (ELECTRONICS), MEASUREMENT,  
MANUFACTURING METHODS.

IDENTIFIERS: PASSIVATION (SEMICONDUCTOR). (U)

CONTENTS: IMPROVED KPR RESOLUTION CONTACT  
EVAPORATION AND ALLOYING COLLECTOR ETCHING BORON  
DIFFUSION PHOSPHORUS DIFFUSION COLLECTOR  
CONTACT TO THE HEADER INTERCONNECTIONS  
RELIABILITY MEASUREMENT INSPECTION AND QUALITY  
CONTROL PLAN (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-404 S37

RADIO CORP OF AMERICA SOMERVILLE N J

PRODUCTION ENGINEERING MEASURE ON ZN1708 SILICON  
PLANAR EPITAXIAL TRANSISTOR.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 3, 1 NOV 62-31  
JAN 63,

JAN 63 36P POSSEMATO,L.R.;  
CONTRACT: DA36 039SC86729

UNCLASSIFIED REPORT

DESCRIPTORS: \*MANUFACTURING METHODS, \*TRAN  
SISTERS, SILICON, CLEANING, EPITAXIAL GROWTH,  
DIFFUSION, CHEMICAL MILLING, CONTAMINATION,  
IMPURITIES, PHOSPHORUS, FIXED CONTACTS, GOLD,  
HALFUNCTIONS, PROCESSING.

(U)

A TECHNIQUE OF ETCHING THE WAFERS WITH ANHYDROUS  
HCL IN THE EPITAXIAL TUBE PRIOR TO EPITAXIAL  
DEPOSITION WAS INCORPORATED INTO THE PROCESS. THE  
OXIDE ON THE SURFACE OF THE WAFER SERVES AS A MASK  
DURING THE DIFFUSION OPERATION AND GENERALLY SERVES  
TO PROTECT THE SILICON SURFACES DURING WAFER  
PROCESSING. IN PERFORMING THESE FUNCTIONS,  
HOWEVER, IMPURITIES MAY BE DIFFUSED INTO THE OXIDE AT  
THE HIGH DIFFUSION TEMPERATURES. A METHOD WAS  
DEVELOPED PROVIDING THE CLEANEST POSSIBLE OXIDE TO  
IMPROVE THE SURFACE PROTECTION ON THE FINISHED  
PELLETS. EXPERIMENTS ARE ALSO BEING MADE ON BAKING  
OF OXIDE TO DIFFUSE ENTRAPPED WATER MOLECULES TO THE  
SURFACE FOR SUBSEQUENT EVAPORATION.

(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-405 861

WESTINGHOUSE ELECTRIC CORP YOUNGWOOD PA

MICROMINIATURE INTEGRATED CIRCUIT PACKAGE. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 2, 1 OCT  
62-1 JAN 63,

JAN 63 11P BARBARO, E.P.:

CONTRACT: DA36 0395C90850

PROJ: DA PROJ. 3A99 21 002 01

UNCLASSIFIED REPORT

DESCRIPTORS: \*MICROMINIATURIZATION (ELEC  
TRONICS), \*INTEGRATED CIRCUITS, \*PACKAGED  
CIRCUITS, \*MODULES-(ELECTRONICS), PROCESSING,  
SEALS (STOPPERS), GRAPHITE, GLASS, CHEMICAL  
MILLING, CLEANING, MECHANICAL PROPERTIES. (U)

TWO SUCCESSIVE DESIGN MODIFICATIONS WERE MADE TO  
THE GRAPHITE GLASSING BOATS IN ORDER TO ACHIEVE MORE  
UNIFORM PACKAGE APPEARANCE. FIFTY PACKAGE SAMPLES  
WERE SUBMITTED FOR MECHANICAL EVALUATION.  
TECHNIQUES FOR SEALING THE INTEGRATED CIRCUIT  
PACKAGE WERE ESTABLISHED. IMPROVED CLEANING  
TECHNIQUES WERE ESTABLISHED FOR DEOXIDIZING KOVAR  
PARTS PRIOR TO GOLD PLATING RESULTING IN LESS PITTING  
OF THE METAL. STAMPED LEAD PRE FORMS RECEIVED  
DURING THIS PERIOD. THE FIRST ONE HUNDRED  
MICROMINIATURE CIRCUIT PACKAGES SUBMITTED WERE  
FABRICATED WITH ETCHED LEADS. THE STAMPED LEADS ARE  
MORE UNIFORM IN CROSS SECTION. CERAMIC MICROMODULES  
WITH PAWS WERE DESIGNED AND ORDERED. THIS  
MICROMODULE WILL BE UTILIZED TO DEVELOP AN INTEGRAL  
PACKAGE USING THE CERAMIC MICROMODULE AS A BASE.

(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-408 19U

ARMY ELECTRONICS LABS FORT MONMOUTH N J

TECHNOLOGY FOR PNP PLANAR SILICON TRANSISTORS:  
SWITCHING AND AMPLIFYING,

(U)

MAR 63 ZIP LAROCQUE, ARMOND P.; YATSKO,  
ROBERT S.; ROGEL, ALEX; JACKSON, RAYMOND IRIBEL,  
VINCENT E.

REPT. NO. TR-2339

PROJ: DA-3-A-992100302

UNCLASSIFIED REPORT

DESCRIPTORS: (TRANSISTORS, MANUFACTURING  
METHODS), DIFFUSION, IMPURITIES, ANTIMONY,  
BONDING, GAIN, CRYSTAL GROWTH, SILICON,  
CHEMICAL MILLING, POLISHES, PHOTOENGRAVING,  
BORON, METAL FILMS, TESTS, CAPACITORS,  
RESISTORS, ULTRAHIGH FREQUENCY, GOLD, MICRO  
MINIATURIZATION (ELECTRONICS).

(U)

IDENTIFIERS: 1963, PLANAR TRANSISTORS.

(U)

PROCESSES AND TECHNIQUES REQUIRED FOR FABRICATION  
OF EXPERIMENTAL PLANAR PNP SILICON TRANSISTORS WERE  
DEVELOPED AND DEMONSTRATED AS FEASIBLE. PROCESSES  
INVOLVED INCLUDE MATERIAL PREPARATION, ANTIMONY BASE  
DIFFUSION, BORON EMITTER DIFFUSION, OXIDE MASKING,  
PHOTORESIST TECHNIQUES, SIMULTANEOUS GOLD METALIZING  
OF EMITTER AND BASE REGIONS, COLLECTOR ALLOY CONTACT  
AND BIASING, AND THERMO COMPRESSION BONDING. INITIAL  
TRANSISTORS HAVE TYPICAL DC BETA VALUES OF 35 TO 40  
AND FT VALUES AS HIGH AS 350 MCS. PROCESSES  
DESCRIBED WERE ALSO USED IN PRELIMINARY FABRICATION  
OF SOLID STATE MICROCIRCUIT PASSIVE COMPONENTS.

(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-412 841

LEAR SIEGLER INC SANTA MONICA CALIF

SEMICONDUCTOR THIN FILMS.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 6, 1 APR-30 JUNE  
63.

63 1BP  
CONTRACT: AF33 657 7623

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTING FILMS), MANUFACTURING METHODS, VAPOR PLATING, VACUUM, GALLIUM COMPOUNDS, ARSENIDES, HALL EFFECT, MEASUREMENT, ELECTRON MICROSCOPY, CHEMICAL MILLING, X-RAY DIFFRACTION ANALYSIS.

(U)

IDENTIFIERS: THIN FILMS

(U)

(1) TO DEPOSIT FILMS IN A DYNAMIC 10<sup>-7</sup> TO THE -8TH POWER VACUUM SYSTEM; (2) TO INVESTIGATE ANNEALING OF GAAS FILMS; (3) TO MAKE HALL MEASUREMENTS AT A SERIES OF TEMPERATURES; (4) TO INVESTIGATE DEPOSITION AT MICRONS PER SECOND; (5) TO IMPROVE THE RESOLUTION IN ELECTRON MICROSCOPE SURFACE STUDIES AND TO INVESTIGATE A SETUP FOR ETCHING THICKER FILMS DOWN TO THICKNESSES SUITABLE FOR ELECTRON MICROSCOPY; AND (6) TO CONTINUE DEVICE STUDIES WITH FILMS OF AVAILABLE QUALITY. (AUTHOR)

(U)

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UNCLASSIFIED

/ZOML6

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-414 913  
RADIO CORP OF AMERICA SOMERVILLE N J

PRODUCTION ENGINEERING MEASURE ON 2N1708  
SILICON PLANAR EPITOXYAL TRANSISTOR.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 4, 1 FEB-30 APR  
63,  
APR 63 87P WARREN,A.; POSSEMATO,L.R.;  
CONTRACT: DA36 039SC86729

UNCLASSIFIED REPORT

DESCRIPTORS: (\*TRANSISTORS, MANUFACTURING  
METHODS), (\*MANUFACTURING METHODS, TRANSIS-  
TORS), CLEANING, EPITOXYAL GROWTH, SEMICONDUC-  
TOR DEVICES, CHEMICAL MILLING, FIXED CONTACTS,  
GOLD, ALUMINUM, CONTAMINATION, BONDING,  
QUALITY CONTROL, RELIABILITY, PROCESSING,  
SURFACES.

(U)

IDENTIFIERS: 1963.

(U)

PROCESS IMPROVEMENTS WERE COMPLETED IN ALL AREAS  
INVESTIGATED. AN IMPROVED METHOD OF REMOVING  
PHOTORESIST WAS DEVELOPED. A STUDY OF INORGANIC  
REAGENT MATERIALS AS SOURCES OF SEMI-CONDUCTOR  
SURFACE CONTAMINATION WAS COMPLETED. CONCLUSIONS  
CONCERNING THE CONCENTRATIONS OF IMPURITIES AND THE  
EFFECTIVENESS OF VARIOUS DESCRIPTION TECHNIQUES ARE  
INCLUDED. THE USE OF THIN ALUMINUM CONTACTS HAS  
INHIBITED FORMATION OF "PURPLE PLAGUE".  
EXPERIMENTS WITH GOLD CONTACTS WERE UNSUCCESSFUL.  
THE USE OF GOLD ALLOY WIRE DID NOT MATERIALLY  
IMPROVE THE BOND STRENGTH. NAILHEAD BONDING WITH  
A SMALLER DIAMETER GOLD WIRE TO REDUCE THE SIZE OF  
THE BALL MET WITH ONLY LIMITED SUCCESS. A PROGRAM  
OF RELIABILITY TESTING AND ANALYSIS AND STUDIES OF  
NORMAL RESISTANCE MEASUREMENTS FROM JUNCTION TO  
AMBIENT (T SUB J-A) WERE COMPLETED.

(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZCML6

AD-418 226

KELSEY-HAYES CO ROMULUS MICH

THE DESIGN AND EVALUATION OF PERFORATED ION  
EMITTERS.

(U)

DESCRIPTIVE NOTES: FINAL REPT. MAY 62-AUG 63,  
SEP 63 1V PETRICK,E.N.,KRAUSS,J.J.  
CONTRACT: AF33 657 8638  
PROJ: AF-3141  
TASK: 3141U2  
MONITOR: ASD TDR63 750

UNCLASSIFIED REPORT

DESCRIPTORS: (\*ION ENGINES, ION SOURCES), (\*ION  
SOURCES, CESIUM), (\*CESIUM, IONIZATION),  
ELECTRIC PROPULSION, MANUFACTURING METHODS,  
ELECTRON BEAMS, CHEMICAL MILLING, SHEETS,  
RELIABILITY, FEASIBILITY STUDIES, POROUS  
METALS, GAS FLOW, NITROGEN, TUNGSTEN, MOLY  
BDENUM.

(U)

IDENTIFIERS: 1963.

(U)

THE FEASIBILITY OF UTILIZING EMITTERS OF PERFORATED SOLID SHEET RATHER THAN A SINTERED POWDER STRUCTURE WAS INVESTIGATED WITH THE OBJECTIVE OF INCREASING THE RELIABILITY AND DURABILITY OF ION ENGINES. VARIOUS TECHNIQUES FOR DRILLING MICRON-SIZE HOLES IN REFRACTORY METALS WERE EXPLORED. TWO OF THESE PROCESSES, ELECTRON BEAM DRILLING AND CHEMICAL PHOTO-ETCHING, WERE USED TO PROVIDE TEST EMITTERS WITH HOLE SIZES IN THE 10-MICRON RANGE. AN ELECTRON BEAM DRILLED EMITTER WAS CS FLOW TESTED FOR 83 HOURS AND EXHIBITED, WITHIN EXPERIMENTAL LIMITS, NO DIS CERNIBLE CHANGE IN HOLE SIZE OR FLOW CONDUCTANCE. IN SEPARATE TESIS CORRELATION WAS MADE OF THEORETICAL AND MEASURED FLOW RATES OF N AND CS THROUGH THE EMITTERS. IT WAS DETERMINED THAT THE MEASURED CS FLOW RATE EXCEEDED THE THEORETICALLY CALCULABLE VALUE BASED ON AVAILABLE SURFACE DIFFUSION FORMULAE.

(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-418 684

GENERAL ELECTRIC CO SYRACUSE N Y

MATRIX CONTROLLED DISPLAY DEVICE.

(U)

DESCRIPTIVE NOTE: INTERIM DEVELOPMENT REPT. NO. 1, 1  
JULY 16 SEP 63.

AUG 63 3OP

CONTRACT: NOBSR89334

PROJ: SR080301

TASK: 9475

UNCLASSIFIED REPORT

DESCRIPTORS: (\*DISPLAY SYSTEMS, ELECTRONIC RECORDING SYSTEMS), (\*ELECTRONIC RECORDING SYSTEMS, GEOMETRIC FORMS), FEASIBILITY STUDIES, VIEWING SCREENS, BRIGHTNESS, THERMOPLASTICS, DEFORMATION, CIRCUITS, PHOTOENGRAVING, OPTICS, CHEMICAL MILLING, ELECTRODES, TEST EQUIPMENT.

(U)  
(U)

IDENTIFIERS: 1963, MATRIX CONTROLLED DISPLAY.

A DESCRIPTION IS PRESENTED OF THE WORK ACCOMPLISHED TO DEVELOP A FEASIBILITY MODEL OF A MATRIX CONTROLLED DISPLAY DEVICE USING TECHNIQUES CALLED IN-AIR SURFACE DEFORMATION RECORDING AND TIRP (TOTAL INTERNAL REFLECTION PRISROJEC TION). TO INTRODUCE THE READER TO THESE TECH NIUES, A BRIEF DESCRIPTION OF THEIR BASIC PRINCIPLES IS GIVEN. THE TEST SETUP TO PROVIDE AN ELEMENTAL PORTION OF THE LARGE SCREEN DISPLAY AT 20 TO 30 FOOT-LAMBERTS BRIGHTNESS BY OPTICAL READOUT OF DEFORMATIONS ON A THERMOPLASTIC OR OIL MEDIUM IS DISCUSSED. CIRCUITRY TO IMPLEMENT THE DEFORMATION RECORDING TECHNIQUE USING X-Y MATRIX CONTROL IS GIVEN. A BASIC MECHANICAL CON FIGURATION IS CONSIDERED. INFORMATION IS PRO VIDED ON THE PREPARATION OF ARTWORK AND A PHOTO GRAPHIC MASK NECESSARY TO FABRICATE MATRIX ELEC TRODES AT 5, 10, AND 20 LINE PAIRS PER MILLIMETER WITH THREE ELECTRODE WIDTHS. THE RESULTS OF INITIAL EXPERIMENTS IN ETCHING OF TRANSPARENT, CONDUCTIVE COATINGS TO FORM THE ELECTRODES ARE GIVEN. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-419 585

SYLVANIA ELECTRIC PRODUCTS INC WOBURN MASS

PRODUCTION ENGINEERING MEASURE FOR GALLIUM  
ARSENIDE VARACTOR DIODE.

(U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 4, 1 MAR-  
31 MAY 63,  
MAY 63 IV DAVIS,C.F.;FELDMAN,E.J.;  
CONTRACT: DA36 039SC86736

UNCLASSIFIED REPORT

DESCRIPTORS: (VARACTOR DIODES, PRODUCTION),  
(MANUFACTURING METHODS, VARACTOR DIODES),  
GALLIUM ALLOYS, ARSENIC ALLOYS, EPITAXIAL  
GROWTH, FIXED CONTACTS, CONTAINERS, CAPACI-  
TANCE, ELECTRIC POTENTIAL, CHEMICAL MILLING,  
DIFFUSING, IMPURITIES, ZINC, TELLURIUM,  
ARSENIC, PHOTOENGRAVING.

(U)

IDENTIFIERS: 1963, MESA (SEMICONDUCTOR).

(U)

STUDIES TO OBTAIN THE PROCESSES NECESSARY FOR THE  
HIGH VOLUME PRODUCTION OF GALLIUM ARSENIDE VARACTOR  
DIODES ARE DESCRIBED IN THIS REPORT. THESE  
INVESTIGATIONS INCLUDE STUDIES OF MESA CONTACTS,  
EPITAXIAL MATERIAL, PACKAGING, OHMIC CONTACTS AND  
ETCHING PROCEDURES. THE RESULTS OF THE FABRICATION  
OF COMPLETELY EPITAXIAL DIODES AND DIFFUSED  
EPITAXIAL DIODES ARE DISCUSSED AS WELL AS  
CONTROLABLE ETCHING PROCEDURES FOR VOLUME PRODUCTION.  
(AUTHOR)

(U)

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UNCLASSIFIED

/Z0ML6

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZQML6

AD-420 375

WESTINGHOUSE ELECTRIC CORP DAYTON OHIO

500 C SILICON CARBIDE RECTIFIER PROGRAM. (U)

DESCRIPTIVE NOTE: INTERIM TECHNICAL PROGRESS REPT. NO. 8,  
1 JULY30 SEP 63.

OCT 63 20P CHANG, H. C.; JENNINGS, V. J.  
THORNBURG, D. R.; KROK, L. J.; OSTROSKI, J. I.

CONTRACT: AF33 657 7027

PROJ: 7 727

MONITOR: ASD IR7 727, VOL. 8

UNCLASSIFIED REPORT

DESCRIPTORS: (\*CRYSTAL RECTIFIERS, SILICON ALLOYS),  
(\*SILICON ALLOYS, CRYSTAL RECTIFIERS), (\*DIODES  
(SEMICONDUCTORS), SILICON ALLOYS), POWER EQUIPMENT  
PARTS, CARBON ALLOYS, HIGHTEMPERATURE RESEARCH,  
EPITAXIAL GROWTH, IMPURITIES, CHEMICAL MILLING, BORATES,  
SODIUM COMPOUNDS, LIFE EXPECTANCY, STORAGE, SURFACE  
PROPERTIES, MANUFACTURING METHODS, TESTS (U)

IDENTIFIERS: 1963 (U)

EFFORTS WERE CONTINUED ON THE DEVELOPMENT OF 500  
DEGREE C SILICON CARBIDE RECTIFIERS. THE GROWTH  
RATE OF SILICON CARBIDE CRYSTALS PREPARED BY THE  
SUBLIMATION METHOD WAS DETERMINED BY MEASURING THE  
AMOUNT OF GROWTH BETWEEN SUCCESSIVE, TIMED DOPANT  
ADDITIONS. THIS WAS COMPARED WITH THE GROWTH RATE  
AS OBTAINED FROM A SIMPLE MODEL. ALL VALUES AGREE  
WITHIN A FACTOR OF FIVE. THE USE OF MOLTEN BORAX  
AS AN ETCHANT FOR SILICON CARBIDE WAS STUDIED. DUE  
TO ITS RELATIVELY SLOW ETCH RATE (ABOUT 30 TIMES  
SLOWER THAN A MOLTEN SODIUM PEROXIDE-SODIUM HYDROXIDE  
MIXTURE) A MUCH FINER CONTROL OF THE ETCHING IS  
POSSIBLE. DETAILS ARE GIVEN ON THE LIFE AND  
STORAGE TESTS WHICH WERE SUCCESSFULLY PASSED BY TWO  
SILICON CARBIDE RECTIFIERS. AN OPEN TUBE-FLOWING  
GAS SYSTEM WAS SHOWN SUITABLE FOR THE SURFACE  
PASSIVATION OF GROUPS OF SILICON CARBIDE RECTIFIERS.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-422 492

BELL TELEPHONE LABS INC WHIPPANY N J

ENGINEERING SERVICES ON TRANSISTORS.

(U)

DESCRIPTIVE NOTES: QUARTERLY PROGRESS REPT. NO. 1, 1 APR-  
30 JUNE 63.

SEP 63 1V ARNOLD, S. R., DAVIS, R. E.;  
GIBBONS, G., KOCSIS, J., MARTERSTECK, K. E.;  
REPT. NO. 12  
CONTRACT: DA36 039AMCO2227  
PROJ: 3A99 21 001

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: CONTINUATION OF CONTRACT DA36-  
0395C9U759.

DESCRIPTORS: (\*TRANSISTORS, MANUFACTURING METHODS),  
(\*INTEGRATED CIRCUITS, TRANSISTORS), GERMANIUM, SILICON,  
ELECTRIC POTENTIAL, SUPERHIGH FREQUENCY, CHEMICAL  
MILLING, ELECTRIC CURRENTS, EPITAXIAL GROWTH, ELECTRICAL  
CONDUCTANCE, RESISTORS, AGING (MATERIALS), DIODES  
(SEMICONDUCTOR), CIRCUITS, ELECTRONIC SWITCHES,  
ULTRAHIGH FREQUENCY, TEMPERATURE, BONDING, OXIDES (U)  
IDENTIFIERS: THIN FILMS, THIN FILMS (U)  
ELECTRONICS (U)

RESEARCH CONCERN STUDIES AND INVESTIGATIONS RELATED TO TRANSISTORS AND TRANSISTOR-LIKE DEVICES, WITH A VIEW TOWARD DEMONSTRATING AND INCREASING THE PRACTICABILITY OF THEIR USE IN OPERATING EQUIPMENT. WORK IS DISCUSSED ON A 6-GC GERMANIUM TRANSISTOR AND INTEGRATED CIRCUIT DEVICES. A COMPARISON IS MADE OF ELECTRICAL BREAKDOWN CHARACTERISTICS OF GERMANIUM DIODES MADE BY PLANAR TECHNIQUES AND BY MESA ETCHING. IT IS SHOWN THAT FOR THE PLANAR TYPE THE REVERSE CURRENT VOLTAGE CHARACTERISTIC WILL BE SOFTER THAN THAT OF A MESA DIODE FROM THE SAME MATERIAL AND THE BREAKDOWN VOLTAGE WILL BE LOWER. BREAKDOWN VOLTAGE IS CALCULATED FOR EPITAXIAL GERMANIUM AND SILICON STRUCTURES. IT IS SHOWN THAT WHEN THE CONDUCTIVITY OF THE SUBSTRATE AND THE DIFFUSED LAYER ARE BOTH MUCH GREATER THAN THAT OF THE EPITAXIAL LAYER, THEN FOR THIN LAYERS THE BREAKDOWN VOLTAGE DEPENDS ONLY ON THE THICKNESS BETWEEN THE DIFFUSED JUNCTION AND THE SUBSTRATE. FABRICATION TECHNIQUES AND PROBLEMS RELATED TO THE 6-GC TRANSISTOR ARE DISCUSSED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-422 940

RAYTHEON CO LEWISTON MAINE

PRODUCTION ENGINEERING MEASURE ON SILICON ALLOY  
TRANSISTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 3, 1 JAN-31 MAR  
63.

MAR 63 28P JONES, R. W. I  
CONTRACT: DA36 039SC86744

UNCLASSIFIED REPORT

DESCRIPTORS: (\*TRANSISTORS, PRODUCTION), (\*MANUFACTURING  
METHODS, TRANSISTORS), RESISTANCE (ELECTRICAL), SILICON,  
RELIABILITY (ELECTRONICS), TIN, ALLOYS, FIXED CONTACTS,  
SOLDERING, CHEMICAL MILLING, FAILURE (MECHANICS),  
QUALITY CONTROL, CRYSTAL LATTICE DEFECTS, SOLDERING  
FLUXES (U)

IDENTIFIERS: 1963, JET ETCHING, VIBRATORY ETCHING,  
PASSIVATION (SEMICONDUCTOR) (U)

EFFORTS CONTINUED ON THE IMPROVEMENT OF PRODUCTION  
TECHNIQUES TO INCREASE THE RELIABILITY OF SILICON  
TRANSISTORS. FURTHER CONTROL OF CHIP DIMENSIONS WAS  
ACHIEVED. THE BULK MATERIAL PARAMETERS OF  
RESISTIVITY AND DISLOCATION DENSITY WERE STUDIED.  
METALLOGRAPHIC ANALYSIS OF ALLOYING LED TO FIRING  
JIG REDESIGN. THE EFFECTS OF TIN, DISLOCATION  
DENSITY, AND CHIP THICKNESS ON ALLOYING WERE  
DETERMINED. AN IMPROVED Emitter WHISKER WAS  
INTRODUCED. HIGH TEMPERATURE SOLDER WAS INTRODUCED  
WITH PARTIAL FLUX ELIMINATION. A NEW APPROACH TO  
MORE EFFICIENT ETCHING WAS EXPLORED. STEP-STRESS  
EQUIPMENT IS UNDER CONSTRUCTION. FORMAL FAILURE  
MODE ANALYSIS IS INITIATED. OPERATION STANDARDS,  
DRAWINGS, AND QUALITY INSPECTION PROCEDURES WERE  
ISSUED AND WORK ON THE INSPECTION AND QUALITY CONTROL  
PLAN WAS INITIATED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO: /ZDML6

AD-423 325

GENERAL ELECTRIC CO IRMO S C

SOLID ELECTROLYTE TANTALUM FOIL CAPACITOR.

(U)

DESCRIPTIVE NOTE: QUARTERLY RESEARCH AND DEVELOPMENT REPT.

1 JULY27 SEP 63,

SEP 63 27P JENNY, A. L. :

CONTRACT: N0B5R09386

PROJ: SRU080303

TASK: 9636

UNCLASSIFIED REPORT

DESCRIPTORS: (TANTALUM CAPACITORS, FOILS),  
ELECTROLYTES, SOLIDS, PHOSPHORIC ACIDS, CLEANING,  
MANGANESE COMPOUNDS; OXIDES, SEMICONDUCTORS,  
ELECTRODEPOSITION, AGING (MATERIALS), CATHODES, CHEMICAL  
MILLING

(U)

IDENTIFIERS: 1963, ETCHING

(U)

EXPERIMENTAL WORK HAS SHOWN THAT UNDER CERTAIN CONDITIONS PERMANENT DAMAGE TO THE ANODIC OXIDE CAN BE MADE DURING THE PROCESS OF DEPOSITING THE MANGANESE OXIDE. FROM THE VIEWSPOINT OF THE SOLID FOIL TANTALUM CAPACITOR, THE RESULTS SUGGEST THAT A MINIMUM NUMBER OF DEPOSITION CYCLES MUST BE USED WITH CAREFUL CONTROL OF THE SOLUTION CONCENTRATION. THE BREAKDOWN VOLTAGE TESTS CONFIRM THAT THE TYPE OF TANTALUM FOIL, IN PARTICULAR, THE SURFACE CONDITION, HAS A CONTROLLING EFFECT ON SUBSEQUENT HIGH VOLTAGE PERFORMANCE. THE FORMATION CONDITIONS, FORMATION VOLTAGE, NUMBER OF COATS OF MANGANESE DIOXIDE, AREA OF DEPOSIT AND TIME AT DECOMPOSITION TEMPERATURE ARE ALSO VERY IMPORTANT IN CONTROLLING THE BREAKDOWN VOLTAGE. FOR THE 250 VOLTS SOLID FOIL CAPACITOR APPLICATION, IT IS SOMEWHAT DISTURBING TO NOTE THAT THE BEHAVIOR OF THE TA205/MNOX INTERFACE APPEARS TO CHANGE FOR THICKNESS GREATER THAN THE EQUIVALENT OF 200 VOLTS FORMATION. MORE WORK IS NECESSARY TO DETERMINE WHETHER THE POORER PERFORMANCE AT THE HIGHER VOLTAGES IS DUE TO SOME BASIC PHYSICAL PHENOMENA OR DUE TO UNSUITABLE TANTALUM FOIL AND PROCESSING CONDITIONS WHICH ARE NOT THE OPTIMUM.

(AUTHOR)

(U)

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UNCLASSIFIED

/ZDML6

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZDML6

AD-423 367

NAVAL ORDNANCE LAB WHITE OAK MD

POLISHES AND ETCHES FOR TIN TELLURIDE, LEAD SULFIDE,  
LEAD SELENIDE, AND LEAD TELLURIDE, (U)

MAY 63 27P NORR, MARRINER K. I  
REPT. NO. NOLTR-63-156

UNCLASSIFIED REPORT

DESCRIPTORS: (\*CHEMICAL MILLING, CRYSTALS),  
(\*ELECTROLYTIC POLISHING, CRYSTALS), (\*CRYSTALS,  
PRECISION FINISHING), SELENIDES, SULFIDES, TELLURIDES,  
LEAD COMPOUNDS, TIN COMPOUNDS, ETCHED CRYSTALS,  
CASTINGS, CRYSTAL LATTICE DEFECTS, SOLUTIONS, REVIEWS,  
SELENIUM ALLOYS, TELLURIUM ALLOYS, LEAD ALLOYS, TIN  
ALLOYS (U)

IDENTIFIERS: 1963, ETCHES, POLISHES (U)

A REVIEW IS GIVEN OF CHEMICAL AND ELECTROLYTIC  
POLISHES AND DISLOCATION ETCHES FOR SNT, PBS,  
PBSE, AND PBTE, COVERING THE PERIOD  
FROM 1907 TO 1962. RECIPES, CONDITIONS, AND RESULTS  
ARE DESCRIBED. SATISFACTORY POLISHES FOR ALL  
COMPOUNDS EXCEPT PBS AND ETCHES FOR ALL EXCEPT  
SNT ARE INCLUDED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-423 388

GENERAL DYNAMICS/FORT WORTH TEX

DEVELOPMENT OF CHEMICAL MILLED WAFFLE GRID BERYLLIUM  
STRUCTURAL PANEL,

(U)

NOV 63 31P ROGERS,C. H.;FEHRLE,A. C.;  
LOVE,T. S.;  
REPT. NO. ERR FW135  
CONTRACT: AF33 657 11214

UNCLASSIFIED REPORT

DESCRIPTORS: (\*BERYLLIUM, METAL PLATES), (\*METAL PLATES,  
CHEMICAL MILLING), MATERIAL REMOVAL, TENSILE PROPERTIES,  
STRESSES, STRAIN (MECHANICS), COMPRESSIVE PROPERTIES,  
STRUCTURAL PROPERTIES, ELASTICITY, SHEAR STRESSES,  
STRUCTURAL PARTS, AEROSPACE CRAFT

(U)  
(U)

THIS REPORT CONCERNS THE RESEARCH AND DEVELOPMENT  
OF AN AEROSPACE STRUCTURAL PANEL MADE FROM QMV  
BERYLLIUM HOT-ROLLED PLATE. THE PROGRAM WAS A  
JOINT EFFORT OF THREE COMPANIES. THE BRUSH  
BERYLLIUM COMPANY MANUFACTURED THE BERYLLIUM  
PLATE. THE UNITED STATES CHEMICAL MILLING  
CORPORATION MILLED THE INTEGRALLY STIFFENED  
STRUCTURAL PANEL TO THE DESIGN SPECIFICATION  
ESTABLISHED BY THE GENERAL DYNAMICS  
CORPORATION/ FORT WORTH. GENERAL DYNAMICS  
CORPORATION/FORT WORTH CONDUCTED THE FINAL  
STRUCTURAL TESTS ON THE FINISHED PANEL. RESULTS OF  
THIS PROGRAM CONFIRM THE ABILITY OF TODAYS TECHNOLOGY  
TO PRODUCE A SATISFACTORY STRUCTURAL PANEL MADE FROM  
BERYLLIUM. THE MOST CRITICAL PROBLEM ENCOUNTERED  
WAS THE VARIATION OF APPARENT MODULUS OF ELASTICITY.  
STATIC STRENGTH WAS FOUND TO VARY EXCESSIVELY WITH  
SURFACE FINISH. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-425 102

MCDONNELL AIRCRAFT CORP ST LOUIS MO

CHEMICAL MILLING OF NARROW CLOSE TOLERANCE SLOTS IN  
ALUMINUM AND STAINLESS STEEL.

(U)

DESCRIPTIVE NOTE: FINAL REPT.,

DEC 63 22P WEEKS, ROBERT F. ; MALAKELIS,

ELIAS :

REPT. NO. A239

CONTRACT: AF33 657 11215

UNCLASSIFIED REPORT

DESCRIPTORS: (\*STAINLESS STEEL, CHEMICAL MILLING),  
(\*ALUMINUM, CHEMICAL MILLING), (\*CHEMICAL MILLING,  
FLUIDS), PANELS (STRUCTURAL), MATERIAL REMOVAL,  
VARNISHES, PHOTOSENSITIVITY, METALLOGRAPHY, SOLUTIONS,  
PHOTOMICROGRAPHY

(U)

IDENTIFIERS: 7176-T6 ALUMINUM, 321 STAINLESS STEEL.

(U)

ETCHANTS, MASKANTS, 1963

(U)

FIVE TYPES OF MASKANTS AND THREE ETCHANT SOLUTIONS  
WERE EVALUATED FOR THE PURPOSE OF PRODUCING PRECISION  
SLOTS IN STAINLESS STEEL AND ALUMINUM. THE SCREEN  
PRINTING MASKANTS TESTED WERE NELCO SILK SCREEN  
STOP-OFF LACQUER R-5018 AND MEAKER STOP-OFF  
LACQUER. THE PHOTOSENSITIVE MASKANTS TESTED  
WERE KODAK PHOTO RESIST, KODAK METAL ETCH  
RESIST, AND KODAK PHOTO LACQUER.

COMBINATIONS OF THE DIFFERENT PHOTOSENSITIVE  
MASKANTS WERE ALSO TESTED. THE 321 STAINLESS STEEL  
PANELS WERE MILLED WITH STEEL CHEM-MILL ETCHANTS PER  
PS 20022-2 AND THE 7178-T6 ALUMINUM PANELS WERE  
MILLED WITH EITHER HCL SOLUTION OR AN ALKALINE  
ETCHANT SOLUTION PER PS 20023. THE HYDROGEN ION  
NORMALITY WAS KEPT WITHIN A SPECIFIED NORMALITY RANGE  
DURING THE STEEL CHEM-MILLING. THE CUTTING RATE OF  
THE ETCHANT SOLUTION VARIED DEPENDING ON THE  
HYDROGEN ION CONCENTRATION, THE SPRAYING CONDITIONS,  
AND THE MASKANT CONFIGURATION. THE ONLY SUITABLE  
MASKANT TESTED ON STEEL WAS KODAK PHOTO RESIST  
OVER KODAK METAL ETCH RESIST. THE MEAKER  
AND NELCO MASKANTS WERE TESTED FOR CHEM-MILLING  
ALUMINUM. BOTH MASKANTS WERE SUITABLE FOR MILLING  
THE LARGER SLOT WIDTHS. THE CUTTING RATE VARIED  
DEPENDING ON ETCHANT SOLUTION AND MASKANT  
CONFIGURATION. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-426 356

CRYSTALONICS INC CAMBRIDGE MASS

PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION  
TECHNIQUES AND TO INSURE THE RELIABILITY OF THE C600  
SERIES FIELD EFFECT TRANSISTORS. (U)

DESCRIPTIVE NOTES QUARTERLY REPT. NO. 1, 1 JULY-30 SEP  
63,

SEP 63 41P WILLIAMS, JOHN R. ;  
CONTRACT: DA36 039AMC01483E

UNCLASSIFIED REPORT

DESCRIPTORS: (TRANSISTORS, PRODUCTION), SILICON,  
DIFFUSION, POSITIONING DEVICES (MACHINERY), BONDING,  
ULTRASONIC RADIATION, CHEMICAL MILLING, OXIDATION,  
BORON, RELIABILITY (ELECTRONICS) (U)

IDENTIFIERS: 163, FIELD EFFECT TRANSISTORS (U)

IMPROVEMENTS WERE MADE IN THE DIFFUSION EQUIPMENT  
AND TECHNIQUE.ULK-DIFFUSION WAS STUDIED AND  
GRAPHS PRESENTED OF DIFFUSION DISTANCE VERSUS TIME.  
STUDIES WERE ALSO MADE OF THE DIODE  
CHARACTERISTICS AS A FUNCTION OF DIFFUSION CONDITION.  
ULTRASONIC BONDING - AN ULTRASONIC BONDER WAS  
PURCHASED AND INSTALLED. PRELIMINARY EVALUATION OF  
USB DEVICES WERE MADE. MASKS AND ALIGNMENT  
SYSTEMS - A NEW MASK ALIGNMENT SYSTEM WAS  
PURCHASED AND INSTALLED. MASKS WERE ORDERED FOR  
INTERNAL SHORTING OF THE DEVICE. ETCHING FIXTURE  
- SEVERAL PROTOTYPE DESIGNS WERE FABRICATED AND  
EVALUATED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD426 932

ARMY MISSILE COMMAND REDSTONE ARSENAL ALA ARMY INERTIAL  
GUIDANCE AND CONTROL LAB AND CENTER

MISSILE-BORNE TRACKING ANTENNA.

(U)

DESCRIPTIVE NOTE: FINAL PROGRESS REPT. FOR 1963,

JUL 63 52P HOWELL, JAMES E.:

REPT. NO. RG-TR-63-2U

UNCLASSIFIED REPORT

DESCRIPTORS: (\*GUIDED MISSILE ANTENNAS, ELECTRONIC SCANNERS), PHASE MEASUREMENT, POLARIZATION, AUTOMATIC, TRACKING, ANTENNA FEEDS, IMPEDANCE MATCHING, COAXIAL CABLES, ANTENNA CONFIGURATIONS, ANTENNA LOBES, SUPERHIGH FREQUENCY, HELICAL ANTENNAS, SPIRAL ANTENNAS, PRINTED CIRCUITS, CHEMICAL MILLING, CAVITY RESONATORS, GRAIN, PHASE SHIFTERS, ANTENNA RADIATION PATTERNS.

(U)

IDENTIFIERS: 1963, LOGARITHMIC SPIRAL ANTENNA, BALUN.

(U)

THE DEVELOPMENT OF ELECTRONICALLY STEERABLE, AUTOMATICALLY SELF-DIRECTING, MISSILE-BORNE ANTENNAS IS DESCRIBED. THE LITERATURE WAS SEARCHED AND A PRELIMINARY STUDY WAS MADE ON THE USE OF CIRCULARLY POLARIZED ANTENNAS FOR PRODUCING THE NECESSARY PHASE SHIFTS REQUIRED IN THE LOBING OF ANTENNA ARRAYS. HELICAL ANTENNAS WERE USED FIRST IN TESTS AROUND 5,000 MC IN AN EFFORT TO DETERMINE THE PHASING CHARACTERISTICS AND FEASIBILITY OF CIRCULARLY POLARIZED ANTENNAS. NEXT, A CAVITY-BACKED ARCHIMEDEAN SPIRAL ANTENNA AND BALUN WERE DESIGNED AND FABRICATED FOR 5,000 MC OPERATION. A LOGARITHMIC SPIRAL ANTENNA WAS ALSO DESIGNED AND FABRICATED FOR USE IN THE DEVELOPMENTAL ANTENNA TESTS. THE SPIRAL ANTENNAS WERE FABRICATED FROM COPPER CLAD BOARD BY PRINTED CIRCUIT ETCHING TECHNIQUES. SOME OF THE PROBLEMS ENCOUNTERED DURING LABORATORY TESTS WERE BALUN UNBALANCE, RADIATION FROM THE BALUN AND THE DETRIMENTAL EFFECTS OF THE REFLECTED WAVE WHEN USING CAVITIES.

(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-431 602

MCDONNELL AIRCRAFT CORP ST LOUIS MO

ELECTROCHEMICAL DEBURRING OF MOLYBDENUM, ALUMINUM AND  
STAINLESS STEEL.

(U)

DESCRIPTIVE NOTE: FINAL REPT.,  
MAR 64 54P WOOLF, JAMES E.  
REPT. NO. A478  
CONTRACT: AF33 657 11215

UNCLASSIFIED REPORT

DESCRIPTORS: (\*METALS, MATERIAL REMOVAL), (\*MATERIAL  
REMOVAL, ELECTROCHEMISTRY), CHEMICAL MILLING,  
ELECTROLYTIC POLISHING, MOLYBDENUM, ALUMINUM ALLOYS,  
STAINLESS STEEL, SOLUTIONS, ALCOHOLS, CHROMIC ACIDS,  
NITRIC ACID, SULFURIC ACID, FLUORINE COMPOUNDS, ACIDS (U)

SHARP EDGES LEFT AFTER CHEMICAL MILLING AND  
BLANKING ARE PRESENTLY BEING MECHANICALLY REMOVED AT  
HIGH COST. THE SHARP EDGES WOULD BE AREAS OF HIGH  
CURRENT DENSITY IN ELECTROCHEMICAL OPERATIONS AND  
COULD BE EASILY REMOVED IN ELECTROCHEMICAL  
SOLUTIONS. THE CRITERIA OF A GOOD ELECTROCHEMICAL  
DEBURRING SOLUTION WERE LEVELING CHARACTERISTICS AND  
REMOVAL RATE. VARIOUS SOLUTIONS WERE EVALUATED FOR  
BREAKING SHARP EDGES ON MOLYBDENUM, AMONG THEM BEING  
25% BY WEIGHT NITRIC ACID, NITRIC-HYDROFLUORIC ACID  
SOLUTION FOR MILLING MOLYBDENUM AND VARIATIONS OF  
TURCO 105 STEEL ETCHANT. THESE SOLUTIONS WERE  
SUCCESSFUL IN A LEVELING ACTION ON SHARP BURRS, BUT  
WOULD NOT ROUND THE SIDE EDGES. A COMBINATION OF  
NITRIC ACID LEVELING AND SIDE EDGE BURNISHING  
PRODUCED THE MOST PROMISING RESULTS. ALUMINUM AND  
STAINLESS STEEL DEBURRING WAS EVALUATED IN  
PROPRIETARY SOLUTIONS, WITH GOOD RESULTS OBTAINED IN  
POLISHING AND BREAKING OF SHARP EDGES. (AUTHOR)

(U)

54

UNCLASSIFIED

/ZOML6

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-431 617

MCDONNELL AIRCRAFT CORP ST LOUIS MO

DETERMINATION OF MECHANICAL PROPERTIES AND SURFACE  
CONDITION OF CHEM-MILLED CB-5ZR COLUMBIUM ALLOY  
SAMPLES.

(U)

MAR 64 7P JACOBUS, H. I

REPT. NO. A473

CONTRACT: AF33 657 11215

UNCLASSIFIED REPORT

DESCRIPTORS: (\*NIOBium ALLOYS, MECHANICAL PROPERTIES),  
(\*MECHANICAL PROPERTIES, NIOBium ALLOYS), SURFACE  
PROPERTIES, CHEMICAL MILLING, TENSILE PROPERTIES,

ZIRCONIUM ALLOYS, EXPERIMENTAL DATA, METALLOGRAPHY

(U)

IDENTIFIERS: 1964, CB-5ZR NIOBium ALLOY

(U)

MECHANICAL PROPERTIES AND SURFACE CONDITION OF CHEMICALLY  
MILLED SPECIMENS OF CB-5ZR NIOBium ALLOY.

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-433 118

LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF

PACKAGING MINIATURIZATION, CHARGE NUMBERS 31-8027-  
DZ01-01, 31-8027-0901 AND RES 2 AND 4,

(U)

SEP 61 137P ABE, SHIRO ; CHURCHON, STUART ;  
NEWMAN, H. L. ;  
REPT. NO. R5832 3 80 61 41

UNCLASSIFIED REPORT

DESCRIPTORS: (\*MODULES (ELECTRONIC), MANUFACTURING  
METHODS), (\*MANUFACTURING METHODS, MODULES  
(ELECTRONIC)), (\*SWITCHING CIRCUITS, MODULES  
(ELECTRONIC)), AMPLIFIERS, POWER, ENCAPSULATION,  
TRANSISTORS, PRODUCTION, RESISTORS, CAPACITORS, WELDING,  
CHEMICAL MILLING, MINIATURE ELECTRONIC EQUIPMENT,  
PACKAGED CIRCUITS, TABLES, ELECTRICAL PROPERTIES,  
PERFORMANCE (ENGINEERING), DIODES (SEMICONDUCTOR),  
ELECTRIC TERMINALS, SOLDERING, WIRING DIAGRAMS, PRINTED  
CIRCUITS, TEMPERATURE, CONFIGURATION, RELIABILITY  
(ELECTRONICS)

(U)

IDENTIFIERS: 1981

(U)

HIGH POWER AMPLIFIER PARA-PLATE MODULES  
WERE BUILT AND FUNCTIONALLY TESTED. A FEW  
PROTOTYPE MODULES USING WELD PACK AND CHEM-  
MILL TECHNIQUES WERE CONSTRUCTED. SOME PROTOTYPE  
PARA-PLATE LOW POWER FLIP FLOPS WERE ASSEMBLED  
BUT NOT EVALUATED. SEVERAL OTHER VERSIONS OF THE  
LOW POWER FLIP FLOP WERE INVESTIGATED. THIS REPORT  
DESCRIBES THE DESIGN WORK AND INCLUDES ILLUSTRATIONS  
AND TABLES PLUS PRELIMINARY TEST RESULTS, LAYOUT  
ARTWORK, DRAWINGS, ENCAPSULATION TECHNIQUES,  
CONCLUSIONS AND RECOMMENDATIONS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-433 891

XEROX CORP ROCHESTER N Y

LOW-COST MICROCIRCUITS FOR MICROASSEMBLIES.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 2, 1 OCT 63-1  
JAN 64,

JAN 64 55P MYTYCH,C. ;

CONTRACT: DA36 039AMC03257E

UNCLASSIFIED REPORT

DESCRIPTORS: (\*MICROMINIATURIZATION (ELECTRONICS),  
MANUFACTURING METHODS), (\*FIXED RESISTORS,  
MICROMINIATURIZATION (ELECTRONICS)), (\*FIXED CAPACITORS,  
MICROMINIATURIZATION (ELECTRONICS)), PHOTO ENGRAVING,  
VAPOR PLATING, VACUUM APPARATUS, ENVIRONMENTAL TESTS,  
PRINTED CIRCUITS, MODULES (ELECTRONIC), METAL COATINGS,  
COPPER, CHROMIUM, CHEMICAL MILLING, METAL FILMS (U)  
IDENTIFIERS: 1964, DOUBLE-ETCH PROCESS, MULTILAYERED  
FILMS (U)

AN APPROACH TO LOW-COST RESISTOR AND CAPACITOR  
ELEMENTS UTILIZING THE MICROELEMENT WAFER CONCEPT AND  
THE DOUBLE-ETCH PROCESS IS UNDER INVESTIGATION.  
MULTI-LAYERED FILMS WERE PLACED ON CERAMIC  
SUBSTRATES BY VACUUM AND ELECTROLESS DEPOSITION  
TECHNIQUES TO FORM MICROELEMENT WAFERS. THE MULTI-  
LAYERED FILMS ARE CONVERTED TO RESISTOR AND CAPACITOR  
ELEMENTS BY SUBTRACTIVE METHODS, UTILIZING  
XEROGRAPHIC STENCILING AND SELECTIVE ETCHING. DATA  
COVERING T.C.R., TEMPERATURE CYCLING, LOAD LIFE  
STABILITY AND YIELD FOR RESISTOR ELEMENTS IS  
PRESENTED. THE CAPACITOR AND MICROMODULE ASSEMBLY  
PROGRAMS ARE OUTLINED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-438 138

GENERAL DYNAMICS/FORT WORTH TEX

MATERIAL BERYLLIUM WAFFLE PANEL. CHEMICAL MILLED,  
SHEAR TEST OF.

(U)

APR 64 13P MAY, J. ;  
REPT. NO. FTOM 3068

UNCLASSIFIED REPORT

DESCRIPTORS: (\*BERYLLIUM, PANELS (STRUCTURAL)), (\*PANELS  
(STRUCTURAL), BERYLLIUM), CHEMICAL MILLING, SHEAR  
STRESSES, LOADING (MECHANICS), STRAIN (MECHANICS) (U)

SHEAR TEST OF CHEMICAL MILLED BERYLLIUM WAFFLE PANEL.

58

UNCLASSIFIED

/ZOML6

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-438 478

NAVAL AIR ENGINEERING CENTER PHILADELPHIA PA AERONAUTICAL  
MATERIALS LAB

STUDY OF SIZE EFFECT IN FINE BERYLLIUM WIRE PHASE II,  
(U)

MAR 64 2P SOLTIS,PAUL ;  
REPT. NO. NAEC-AML-1909

UNCLASSIFIED REPORT

DESCRIPTORS: (\*BERYLLIUM, WIRE), (\*METALLIC TEXTILES,  
BERYLLIUM), FIBERS, TENSILE PROPERTIES, CHEMICAL  
MILLING, TEST EQUIPMENT, HARDNESS, GRAIN STRUCTURES  
(METALLURGY), PHOTOMICROGRAPHY, FRACTURE (MECHANICS),  
DUCTILITY, SCALE (U)

THE 0.0046-IN. DIAMETER, AS-DRAWN, BERYLLIUM WIRE  
CAN BE CHEMICAL-MILLED TO SIZES NEAR 0.0010IN.  
DIAMETER WHICH SHOW DIMENSIONAL UNIFORMITY AND GOOD  
SURFACE QUALITY. A CONTINUOUS TREND TOWARD HIGHER  
STRENGTH WITH DECREASING DIAMETER OF THE WIRE WAS  
NOTED, AND IT APPEARS POSSIBLE THAT ULTRAFINE WIRE  
WITH STRENGTH APPROACHING THE 200,000 PSI LEVEL CAN  
BE PRODUCED WITH CONSISTENCY. A GOOD DEGREE OF  
DUCTILITY WAS NOTED IN WIRE CHEMICAL-MILLED BELOW  
0.0025-IN. DIAMETER AS EVIDENT IN NECKING OF  
SPECIMENS; ALTHOUGH, THIS DUCTILITY DID NOT APPEAR IN  
TENSILE ELONGATION VALUES. FRACTURE STRENGTHS IN  
WIRE SHOWING DUCTILE FRACTURES REACHED VALUES NEAR  
220,000 PSI. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-450-549

BIGNETICS CORP SUNNYVALE CALIF

AN ECONOMICAL FLAT PACKAGE FOR INTEGRATED CIRCUITS.

(U)

DESCRIPTIVE NOTE: INTERIM DEVELOPMENT REPT. NO. 1, 15

JUNE 15 SEP 64,

SEP 64 22P

CONTRACT: NOBSR91298

UNCLASSIFIED REPORT

DESCRIPTORS: (\*PACKAGING, INTEGRATED CIRCUITS),  
(\*INTEGRATED CIRCUITS, PACKAGING), CIRCUIT  
INTERCONNECTIONS, METAL FILMS, CHEMICAL MILLING,  
ELECTROPLATING, PRODUCTION, MANUFACTURING METHODS,  
SILICON, ALUMINUM

(U)

THE SCHEDULE FOR MAKING THE FIRST SEAL OF THE METAL LEADS TO THE PACKAGE SUBSTRATE IS COMPLETE. BY A PROCESS OF ELECTROPLATING AND ETCHING METAL FILM INTERCONNECTIONS HAVE BEEN LAID DOWN, BUT MANY PROBLEMS REMAIN IN THIS AREA. A FEW CIRCUITS WERE ASSEMBLED ON THIS SUBSTRATE AND WHERE ALL PREVIOUS STEPS WERE SATISFACTORY, ELECTRICAL CONTINUITY HAS BEEN ESTABLISHED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-453 855  
HONEYWELL RESEARCH CENTER HOPKINS MINN

THIN FILM IMAGE CONVERTER.

(U)

DESCRIPTIVE NOTE: INTERIM TECHNICAL PROGRESS REPT. NO. 6,  
24 JUL-23 OCT 64.  
NOV 64 IV KRUSE, PAUL W., PRIBBLE,  
FRED C., SCHULZE, RICHARD G.;  
CONTRACT: DA44 009AMC16BT  
PROJ: AF23.11 001 07

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEMICONDUCTING FILMS, INFRARED IMAGES),  
(\*INFRARED IMAGES, SEMICONDUCTING FILMS), EPITAXIAL  
GROWTH, THICKNESS, GALLIUM ALLOYS, ARSENIC ALLOYS,  
GERMANIUM, ELECTRICAL PROPERTIES, CHEMICAL MILLING,  
DIFFUSION, PROCESSING, FIXED CONTACTS, RESISTANCE  
(ELECTRICAL), PHOSPHORUS ALLOYS, METAL COATINGS, GOLD,  
SILVER, NICKEL, DIODES (SEMICONDUCTOR) (U)

IDENTIFIERS: IMAGE CONVERTERS, ETCHING, THICK  
FILMS (U)

EFFORTS WERE CONTINUED ON A PROGRAM TO CONDUCT  
FUNDAMENTAL STUDIES OF NEW APPROACHES TO IMAGE  
CONVERSION. THE EMPHASIS HAS BEEN UPON EVALUATION  
OF A CONCEPT OF A SOLID STATE THIN FILM IMAGE  
CONVERTER (TFIC). INVESTIGATIONS OF THE  
EPITAXIAL GROWTH OF N-GAAS ON P-GE HAVE MADE IT  
POSSIBLE TO PREPARE 200 MICKON THICK LAYERS OF  
SINGLE CRYSTAL GAAS ON GE. AN EVALUATION OF  
THE ELECTRICAL PROPERTIES OF SAMPLES ETCHED TO A MESA  
CONFIGURATION, TOGETHER WITH CHEMICAL STAINING  
STUDIES OF ANGLE LAPPED SAMPLES, REVEAL THAT AN N-  
GE LAYER IS FORMED BETWEEN THE N-GAAS AND P-  
GE REGIONS DURING THE INITIAL STAGES OF GROWTH.  
THE MOST PROBABLE DONOR IS AS, DIFFUSED FROM THE  
VAPOR INTO THE GE. METHODS FOR PREPARING  
STRONG, OHMIC, LOW RESISTANCE CONTACTS TO N-GAAS,  
P-GAAS, N-GAP, AND P-GAP HAVE BEEN  
DEvised UTILIZING ULTRASONIC SOLDERING. THE BEST  
TECHNIQUES ARE SUMMARIZED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOMI 6

AD4450 378

JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS  
LAB

THE MINISTICK PROCESS FOR PACKAGING INTEGRATED  
CIRCUIT FLAT PACKS.

(U)

DESCRIPTIVE NOTE: TECHNICAL MEMO.,  
APR 65 39P NOYES, CARLTON F.;  
REPT. NO. TG-675  
CONTRACT: N0W62 0604C

UNCLASSIFIED REPORT

DESCRIPTORS: (\*INTEGRATED CIRCUITS, PACKAGING),  
(\*PRINTED CIRCUITS, PACKAGING), PROCESSING,  
MANUFACTURING METHODS, TEMPLATES, CHEMICAL  
MILLING, GLASS TEXTILFS, EPOXY PLASTICS, LAMINATED  
PLASTICS, BONDING, DIELECTRICS,  
MODULES(ELECTRONIC), WELDING  
IDENTIFIERS: MINISTICK PROCESS, SUBSTRATES

(U)  
(U)

THE MINISTICK PROCESS FOR FABRICATING FLAT-PACK  
TYPE MULTILAYER CIRCUITRY BOARDS HAS BEEN DEVELOPED  
BECAUSE OF THE NEED FOR SPACE CIRCUITRY THAT MEETS  
EASE OF DESIGN AND MANUFACTURE REQUIREMENTS.  
STARTING WITH A CIRCUIT DESIGN IN THE FORM OF A  
LOGIC DIAGRAM, THE DESIGN PHASE PROGRESSES TO THE  
FINAL ARTWORK TEMPLATE. THIS TEMPLATE, PHOTO  
REDUCED, IS THE BASIC TOOL IN THE FABRICATION OF THE  
ASSEMBLY FRAMES. THE CIRCUIT OF EACH LAYER OF AN  
ASSEMBLY FRAME IS PRODUCED BY CHEMICALLY MILLING  
SUBSTRATES WHICH HAVE BEEN SENSITIZED WITH THE  
DESIRED CIRCUIT BY USE OF THE FINAL ARTWORK TEMPLATE.  
THESE SUBSTRATES ARE MADE BY LAMINATING AN EPOXY  
GLASS CLOTH DIELECTRIC MATERIAL TO A KOVAR SHEET.  
INDIVIDUAL CIRCUIT LAYERS ARE THEN COMBINED TO FORM  
AN ASSEMBLY FRAME, AND INTEGRATED CIRCUIT MODULES  
ARE WELDED TO THE FRAME TO COMPLETE THE CIRCUITRY.  
WHEN MORE THAN ONE ASSEMBLY FRAME IS REQUIRED TO  
COMPLETE THE CIRCUITRY, THE FRAMES ARE ELECTRICALLY  
CONNECTED BY MEANS OF A MOTHER BOARD. ALTHOUGH  
MULTILAYER CIRCUIT BOARDS ARE USED IN THIS PROCEDURE,  
NO INTERLAYER CONNECTIONS ARE REQUIRED. (AUTHOR)

(U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-485 297 13/8 11/6  
AIR FORCE MACHINABILITY DATA CENTER CINCINNATI OHIO

MACHINING DATA FOR BERYLLIUM METAL.

(U)

JUN 66 22P SNIDER, ROBERT E., IKAHLES,  
JOHN F.;  
REPT. NO. AFMDC-66-3  
CONTRACT: AF 33(615)-5262  
PROJ: AF-9-700

UNCLASSIFIED REPORT

DESCRIPTORS: (\*BERYLLIUM ALLOYS, \*MACHINING),  
(\*BERYLLIUM, MACHINING), TOXICITY, CRYSTAL  
LATTICE DEFECTS, TWINNING(CRYSTALLOGRAPHY),  
FRACTURE(MECHANICS), CHEMICAL MILLING,  
MATERIAL REMOVAL, TENSILE PROPERTIES, HARDNESS,  
CARBIDES, MECHANICAL PROPERTIES,  
MICROSTRUCTURE

(U)

THIS REPORT CONTAINS EVALUATED MACHINING  
INFORMATION FOR BERYLLIUM WHICH HAS BEEN EXTRACTED  
FROM MANY SOURCES. MACHINING DATA ARE TABULATED  
AND PRESENTED IN CHART FORM FOR THE FOLLOWING  
PROCESSES: TURNING, MILLING, DRILLING, BAND SAWING,  
GRINDING, BORING, TREPPANNING, REAMING, ROUTING,  
TAPPING, ELECTRICAL DISCHARGE MACHINING,  
ELECTROCHEMICAL MACHINING, AND CHEMICAL MACHINING.  
ALSO INCLUDED IS A GENERAL COMMENT SECTION DEALING  
WITH THE PROBLEMS ASSOCIATED WITH BERYLLIUM  
MACHINING, SUCH AS TWINNING, MICROCRACKING, TOXICITY,  
CHIPOUT AND SPALLING, AND CUTTING FLUIDS.

(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-603 660

MOTOROLA INC PHOENIX ARIZ

PRODUCTION ENGINEERING MEASURE. HIGH SPEED  
SEMICONDUCTOR SWITCH (TWO TERMINAL) HIGH SPEED  
SEMICONDUCTOR SWITCH (GATE).

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 4, 29 FEB-28 MAY  
64.

MAY 64 32P BURLINGAME, B. G.  
CONTRACT: DA36 039AMC01475E

UNCLASSIFIED REPORT

DESCRIPTORS: (\*ELECTRONIC SWITCHES, SEMICONDUCTOR  
DEVICES), (\*SEMICONDUCTOR DEVICES, MANUFACTURING  
METHODS), BONDING, ULTRASONIC RADIATION, ELECTRIC  
TERMINALS, DESIGN, PACKAGING, DIODES (SEMICONDUCTORS),  
DISKS, CHEMICAL MILLING, EPITAXIAL GROWTH, DIFFUSION,  
METAL COATINGS, ALLOYS, ELECTRICAL PROPERTIES, VAPOR  
PLATING, GOLD, BORON, ALUMINUM, PHOSPHORUS, TEST  
EQUIPMENT (ELECTRONICS)

(U)

A PILOT PRODUCTION FACILITY CAPABLE OF PRODUCING  
HIGH SPEED SEMICONDUCTOR SWITCHES IN ACCORDANCE WITH  
SIGNAL CORPS TECHNICAL SPECIFICATIONS IS  
CONSIDERED. THE MAJOR PROBLEM AREAS TO BE OVERCOME  
IN ORDER TO ACHIEVE THE PURPOSE OF THIS PROGRAM ARE  
FORWARD BREAKOVER VOLTAGE AND CURRENT ON THE TWO-  
TERMINAL DEVICE, FORWARD BLOCKING CURRENT ON THE  
THREE-TERMINAL DEVICE, AND SWITCHING SPEEDS, CURRENT  
CARRYING CAPABILITIES, FORWARD ANODE VOLTAGE, AND  
RATE OF FORWARD VOLTAGE RISE ON BOTH DEVICES. WORK  
PERFORMED DURING THE PERIOD 29 FEBRUARY 1964  
THROUGH 28 MAY 1964 IS COVERED. PACKAGE DESIGNS  
FOR BOTH DEVICES ARE DISCUSSED, AND PROGRESS MADE ON  
ASSEMBLY METHODS, GOLD DIFFUSION, EPITAXIAL, ALLOY,  
AND MOAT-ETCHING PROCEDURES IS REPORTED.

(AUTHOR)

(U)

64

UNCLASSIFIED

/Z0ML6

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-605 425

HARSHAW CHEMICAL CO CLEVELAND OHIO

INVESTIGATION OF THIN FILM CADMIUM SULFIDE SOLAR CELLS.

(U)

DESCRIPTIVE NOTE: QUARTERLY TECHNICAL PROGRESS REPT. NO. 3, 26 MAY-25 AUG 64,

AUG 64 8P SCHAEFER, J. C. HUMRICK, R. J. ;

BELT, R. F. ;

CONTRACT: AF33 A15 1249

PROJ: A173

TASK: 817301, 817332

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-601 459.

DESCRIPTORS: (\*SOLAR CELLS, FILMS), (\*CADMIUM COMPOUNDS, SULFIDES), ENERGY CONVERSION, BATTERIES AND COMPONENTS, ELECTROPLATING, VAPOR PLATING, DEGRADATION, CHEMICAL MILLING, COPPER COMPOUNDS, CHLORIDES, SILICON COMPOUNDS, MONOXIDES, SURFACE PROPERTIES, EFFECTIVENESS (U)

IDENTIFIERS: THIN FILMS (M)

THE DEGRADATION OF ELECTROPLATED CELLS HAS BEEN CLOSELY OBSERVED AND IT HAS BEEN FOUND THAT RECOVERY CAN BE ACCOMPLISHED UNDER PROPER CONDITIONS. CHEMICAL MILLING OF THE SUBSTRATE IS AN EXCELLENT METHOD FOR PRODUCING HIGH POWER TO WEIGHT RATIO CELLS. FABRICATION OF THE ONE-HALF AND ONE SQUARE FOOT MECHANICAL SAMPLE ARRAYS INDICATE IMPROVED TOTAL AREA UTILIZATION FACTORS. PHOTOVOLTAIC CELLS AND DIODES HAVE BEEN PREPARED BY FIRST DEPOSITING A THIN FILM OF CUCL ON CDS. THE CUCL WAS SUBSEQUENTLY CONVERTED TO CU9,555 BY MEANS OF H2S. OPTICAL STUDIES ON ELECTROPLATED AND CHEMIPLATED BARRIERS HAVE SERVED TO CONFIRM THE PRESENCE OF CU2S ALONE OR MIXED WITH CUS. THIN LAYERS OF SiO HAVE BEEN UTILIZED AS A WATER VAPOR BARRIER TO SIGNIFICANTLY DECREASE DEGRADATION OF CELLS. ADDITIONAL THEORETICAL WORK HAS BEEN PERFORMED ON A HETEROJUNCTION MODEL OF THE CELL OPERATION. (AUTHOR) (U)

65

UNCLASSIFIED

/Z0ML6

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD<sup>8</sup>606 191

SILICON TRANSISTOR CORP GARDEN CITY N Y

PRODUCTION ENGINEERING MEASURE TO INCREASE THE  
RELIABILITY OF THE TRANSISTOR TYPE 2N2034. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 4, 1 APR-  
30 JUN 64.

JUN 64 29P COCKING,J. ; COURIER,J. ;  
DES ROCHES,F. ; HUGHES,D. ; MARTIN,E. ;  
CONTRACT: DA36 039AMC01482E

UNCLASSIFIED REPORT

DESCRIPTORS: (•TRANSISTORS, RELIABILITY (ELECTRONICS)),  
PROCESSING, DISKS, SILICON, CLEANING, ABRASIVE BLASTING,  
SOLDERING, CHEMICAL MILLING, ENCAPSULATION, WELDING,  
HERMETIC SEALS, TESTS, CONTROLLED ATMOSPHERES,  
PERFORMANCE (ENGINEERING), NICKEL, PELLETS (U)

THE REPORT DESCRIBES THE PROCESSING DEVELOPMENTS IN  
WAFER CLEANING, MESA DELINEATION, SCRIBING OF WATER,  
PELLET TO NICKEL-PLATED HEADER SOLDERING, NICKEL-  
PLATED CLIP TO PELLET SOLDERING, FINAL ETCH OF  
SOLDERED UNIT, FINAL TEST AND ENCAPSULATION OF ETCHED  
UNITS, AND WELD AND HERMETIC SEAL TESTS FOR THE  
TRANSISTOR TYPE 2N2034. (AUTHOR) (U)

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/Z0ML6

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-606 477

CRYSTALONICS INC CAMBRIDGE MASS

PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION  
TECHNIQUES AND TO INSURE THE RELIABILITY OF THE C600  
SERIES FIELD EFFECT TRANSISTORS.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 4, 1 APR-30 JUN  
84.

JUN 64 40P WILLIAMS, JOHN R. ;  
CONTRACTS DA36 039AMC01483E

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: LEGIBILITY OF THIS DOCUMENT IS IN PART  
UNSATISFACTORY. REPRODUCTION HAS BEEN MADE FROM BEST  
AVAILABLE COPY. SEE ALSO AD-601 433.

DESCRIPTORS: (\*TRANSISTORS, MANUFACTURING METHODS),  
(\*RELIABILITY (ELECTRONICS), TRANSISTORS), BONDING,  
DIES, CHEMICAL MILLING, VACUUM FURNACES, CONTROLLED  
ATMOSPHERES, ENCAPSULATION, INDUSTRIAL EQUIPMENT (U)

ULTRASONIC BONDING HAS BEEN DISCARDED IN PREFERENCE  
TO A NEW-METALLIZATION BALL-BONDING TECHNIQUE. ALL  
PRODUCTION FETS ARE BEING DIE-TO-HEADER BONDED  
USING A HEAVY GOLD PLATE ON DICE AND HEADERS. A  
SLIGHT MODIFICATION HAS BEEN MADE IN THE MASK DESIGN  
TO FACILITATE BONDING. MESA ETCHING FIXTURES AND  
SLICE PREPARATION FIXTURES ARE COMPLETE AND ARE IN  
USE IN THE PRODUCTION PROCESS. VARIOUS EXPERIMENTS  
HAVE BEEN RUN UTILIZING VARIOUS DEW POINT AMBIENTS,  
COATING AGENTS, AND BAKEOUTS. AS A RESULT,  
PRODUCTION UNITS ARE BEING VACUUM BAKED AT 200C.  
AND PACKAGED IN A DRY NITROGEN ATMOSPHERE OF -60C.  
DEW POINT OR BETTER. LIFE TEST RACKS ARE BEING  
CONSTRUCTED. A MANUAL OF Q.C. PROCEDURES HAS  
BEEN PREPARED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-606 819

MARTIN CO DENVER COLO

MANUAL AND REPAIR WELDING OF CHEMICALLY MILLED 2014-T6 ALUMINUM SHEETING.

(U)

AUG 57 27P AGRICOLA, K. R. I  
REPT. NO. WDD-M-MI-57-60

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: LEGIBILITY OF THIS DOCUMENT IS IN PART UNSATISFACTORY. REPRODUCTION HAD BEEN MADE FROM BEST AVAILABLE COPY.

DESCRIPTORS: (\*ALUMINUM ALLOYS, WELDING), (\*WELDING, ALUMINUM ALLOYS), SHEETS, CHEMICAL MILLING, WELDS, TENSILE PROPERTIES, HARDNESS, PANELS (STRUCTURAL), MAINTENANCE

(U)  
(U)

IDENTIFIERS: ALUMINUM ALLOY 2014-T6

A 2 INCH WIDE LAND 0.100 IN. THICK, WILL FULLY RETAIN THE WELD HEAT-AFFECTED ZONE OF REPAIRED WELDS (BASED ON HARDNESS DATA). PARENT METAL PROPERTIES ARE ONLY SLIGHTLY AFFECTED BY WELD HEAT ON REPAIRS OF 1.5 INCH LANDS. VALUES OF 59,000 PSI CAN BE EXPECTED WITH 90 PERCENT CONFIDENCE FOR REPAIRED 1.5 INCH LANDS. IF 95 AND 99 PERCENT CONFIDENCE IS REQUIRED, EXPECTED VALUES FOR REPAIRED 1.5 INCH LANDS ARE 57,500 AND 55,400 PSI. IF LAND WIDTHS OF 1.625 INCHES AND ABOVE ARE USED, PARENT METAL STRENGTH CAN BE EXPECTED FOR MANUAL WELDS FOLLOWED BY REPAIR WELDS.

(U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-607 426

WESTINGHOUSE DEFENSE AND SPACE CENTER BALTIMORE MD

FAILURE MECHANISMS IN MICROELECTRONICS. (U)

DESCRIPTIVE NOTE: FINAL REPT.

AUG 64 100P

REPT. NO. WDSC-385A4

CONTRACT: AF30 602 3017

PROJ: 5519

TASK: 551906

MONITOR: RADC TDR64 252

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: LEGIBILITY OF THIS DOCUMENT IS IN PART UNSATISFACTORY. REPRODUCTION HAS BEEN MADE FROM BEST AVAILABLE COPY.

DESCRIPTORS: (\*MICROMINIATURIZATION (ELECTRONICS), FAILURE (MECHANICS), (\*FAILURE (MECHANICS), MICROMINIATURIZATION (ELECTRONICS)), DIODES (\*SEMICONDUCTOR), DISKS, TRANSISTOR AMPLIFIERS, SILICON COMPOUNDS, OXIDES, SURFACE PROPERTIES, ELECTRICAL PROPERTIES, CHEMICAL MILLING, STRESSES, ELECTRICAL CONDUCTANCE, ELECTRONIC EQUIPMENT, RELIABILITY (ELECTRONICS), SILICON (U)

INVESTIGATIONS WERE PERFORMED ON THREE TYPES OF MICROELECTRONIC DEVICES: MULTIPLE DIODE WAFERS, INVERSION LAYER DIODE AMPLIFIERS, AND VERSATILE LINEAR AMPLIFIERS. TWO FAILURE MECHANISMS WERE IDENTIFIED AND STUDIED IN DETAIL: UNSUSPECTED DIFFUSION BARRIERS FROM PHOTOETCH PROCEDURES, AND VARIATIONS IN PASSIVATION LAYER PROPERTIES. THE RELATIONSHIP TO THESE, OF CURRENT AMPLIFICATION (BETA), OR REVERSE VOLTAGE BREAKDOWN, OF LEAKAGE, AND OTHER QUANTITIES WAS EXAMINED. EACH STEP IN MICROELECTRONIC DEVICE FABRICATION WAS INVESTIGATED FOR ITS CONTRIBUTION TO FAILURE MECHANISMS. A PARTIALLY CONDUCTING REGION IN THE PASSIVATING OXIDE WAS IDENTIFIED AND STUDIED, 300  $\times$  100  $\mu$  FROM THE SILICON. THIS CONTRIBUTES TO THE LEAKAGE IN MICROELECTRONIC DEVICES USUALLY ATTRIBUTED ENTIRELY TO CHANNELS IN THE SILICON. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOMLG

AD-609 349

BATTELLE MEMORIAL INST COLUMBUS OHIO DEFENSE METALS  
INFORMATION CENTER

A SURVEY OF THE COMPARATIVE COSTS OF FABRICATING  
AIRFRAME FROM ALUMINUM AND FROM TITANIUM.

(U)

DESCRIPTIVE NOTE: TECHNICAL NOTE.

APR 64 20P

UNCLASSIFIED REPORT

DESCRIPTORS: (\*TITANIUM ALLOYS, AIRFRAMES), (\*AIRFRAMES,  
COSTS), (\*ALUMINUM ALLOYS, AIRFRAMES), MATERIAL FORMING,  
SHEETS, MACHINING, WELDING, CHEMICAL MILLING, FORGING,  
HEAT TREATMENT, SUPERSONIC PLANES, TRANSPORT PLANES (U)

BY PROCESS, THE COST RATIOS FOR FABRICATING  
TITANIUM AND ALUMINUM ARE ABOUT AS FOLLOWS: SHEET  
FORMING 1.5-2 TO 1, MACHINING 1.5-2 TO 1,  
WELDING .8-2 TO 1, CHEMICAL MILLING 3-4 TO 1,  
ASSEMBLING 1.1 TO 1, FORGING 1.5-2.3 TO 1, HEAT  
TREATING 1.5-5 TO 1. THE CURRENT COST ESTIMATES  
MADE BY THE EXPERIENCED TITANIUM FABRICATORS  
REPRESENT REALISTIC MINIMUM COST RATIOS FOR THE NEXT  
2 OR 3 YEARS. THEY ARE RATIOS WHICH THE LESS  
EXPERIENCED FABRICATORS SHOULD BE ABLE TO APPROACH IN  
ACTUAL PRODUCTION. THE EXPERIENCED FABRICATORS  
COULD PROBABLY NOT IMPROVE ON THEM GREATLY IN THE  
NEXT YEAR OR TWO. THE ABOVE COST RATIOS APPLY ONLY  
TO SPECIFIC FABRICATION OPERATIONS (SUCH AS  
FORMING, MACHINING, WELDING, ETC.). THESE  
OPERATIONS ACCOUNT FOR ONLY A FRACTION OF THE TOTAL  
COST OF MANUFACTURING AN AIRCRAFT. MOST OF THE  
MANUFACTURING COSTS NOT COVERED BY THESE OPERATIONS  
WOULD BE LARGELY UNAFFECTED BY THE CHOICE OF AIRFRAME  
MATERIAL. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-610 434

FRANKLIN INST PHILADELPHIA PA LABS FOR RESEARCH AND  
DEVELOPMENT

RESEARCH IN THE GENERAL FIELD OF SUBSTRUCTURE AND  
DISLOCATION NETWORKS IN METALLIC CRYSTALS. (U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 1 APR 60-30 APR 62,  
APR 62 48P DAMIANO,V. V. STINT,G. S. I

HERMAN,M. ;

REPT. NO. F-A2400

CONTRACT: AF49 638 821

MONITOR: AFOSR 2574

UNCLASSIFIED REPORT

DESCRIPTORS: (\*METALLIC CRYSTALS, CRYSTAL STRUCTURE),  
(\*CRYSTAL STRUCTURE, METALLIC CRYSTALS), CRYSTAL  
SUBSTRUCTURE, CRYSTAL LATTICE DEFECTS, CRYSTALS, ZINC,  
IMPURITIES, CADMIUM, CHEMICAL MILLING, PHOTOMICROGRAPHY,  
CRYSTALLOGRAPHY (U)

THE THREE DIMENSIONAL ASPECTS OF DISLOCATIONS  
SUBSTRUCTURES WERE STUDIED IN CADMIUM DOPED ZINC  
CRYSTALS GROWN FROM THE MELT. PRECIPITATES  
DELINATEATING THE DIS LOCATIONS WERE REVEALED BY  
ETCHING A SURFACE CLOSELY PARALLEL TO THE SLIP PLANE.  
USING A TECHNIQUE OF CONTINUOUS ETCHING AND  
CINEPHOTOMICROGRAPHY, THE COURSE OF THE DISLOCATIONS  
WAS FOLLOWED THROUGH THE CRYSTAL. TANGLES OF  
DISLOCATIONS WERE OBSERVED IN DEFORMED CRYSTALS.  
AFTER ANNEALING A REARRANGEMENT OF DISLOCATIONS  
INTO LOW-ANGLE AND HEXAGONAL NETWORKS WAS EVIDENCED.  
CLOSED LOOPS AND SPIRAL DISLOCATIONS WERE FOUND TO  
BE ASSOCIATED WITH LARGE INCLUSIONS. A MECHANISM  
FOR THE MULTIPLICATION OF DISLOCATIONS AT INCLUSIONS  
WAS PROPOSED. DISLOCATION REACTIONS ACCOUNTING FOR  
THE OBSERVED SUBSTRUCTURES HAVE BEEN PROPOSED.

(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD<sup>2</sup>612 417.

TEXAS INSTRUMENTS INC DALLAS

PRODUCTION ENGINEERING MEASURES (PEM) FOR A GERMANIUM  
MICROWAVE TRANSISTOR. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 1, 30  
JUN-30 SEP 64.

SEP 64 79P

REPT. NO. 03-64-73

CONTRACT: DA36 039AMCn3632E

PROJ: 74057

UNCLASSIFIED REPORT

DESCRIPTORS: (\*TRANSISTORS, MANUFACTURING METHODS),  
(\*MICROWAVE EQUIPMENT, TRANSISTORS), (\*GERMANIUM,  
TRANSISTORS), GAIN, NOISE (RADIO), VAPOR PLATING,  
SILICON COMPOUNDS, DIOXIDES, PACKAGING, ENCAPSULATION,  
INDUCTANCE, GALLIUM, IMPURITIES, VACUUM APPARATUS,  
CHEMICAL MILLING, DIFFUSION, ARSENIC, GOLD, RELIABILITY  
(ELECTRONICS) (U)

THE PROCESS FLOW USED IN FABRICATING THE L-78  
PLANAR EPITAXIAL GERMANIUM DIFFUSED-BASE TRANSISTOR  
IS DESCRIBED. THE INITIAL INTRINSIC F SUB T OF  
PLANAR DEVICES, APPROXIMATELY 1600 MC COMPARED TO  
2050 MC FOR A MESA DEVICE OF COMPARABLE DESIGN USING  
SIMILAR FABRICATION TECHNIQUES, WAS INCREASED TO  
EQUAL THAT OF THE MESA BY OPTIMIZING THE COMPOSITION  
OF THE Emitter MATERIAL. THE L-78 PLANAR DEVICES  
FABRICATED EXHIBIT MINIMUM NOISE FIGURE AT 1.0  
GGGC OF 4.5 TO 5.5 DR AT APPROXIMATELY 1.5 MA OF  
EMITTER CURRENT WHILE PEAK F SUB T OCCURS AT  
APPROXIMATELY 5.0 MA. A MODIFICATION OF THE L-78  
PATTERN, DESIGNATED L-78A, VIA Emitter AREA  
REDUCTION FROM 0.76 MIL SQUARED TO 0.27 MIL SQUARED  
MANIFESTED ITSELF BY A SHIFT IN PEAK F SUB T TOWARD  
LOWER VALUES OF Emitter CURRENT. THE PURPOSE OF  
THIS MODIFICATION IS TO BRING INTO REGISTRY THE E  
PEAK GAIN OF THE DEVICE AND MINIMUM NOISE FIGURE AT  
ONE PARTICULAR BIAS LEVEL. THE MATERIALS USED FOR  
THE BASE STRIPES OF THE PLANAR UNIT WERE OPTIMIZED TO  
PROVIDE GOOD OHMIC CONTACT TO GERMANIUM. ADHERENCE  
OF EXPANDED CONTACTS TO THE ACTIVE REGION OF THE  
DEVICE, THE Emitter AND BASE STRIPES, WAS IMPROVED BY  
EMPLOYING A CHEMICAL ETCH COMPRISED OF INORGANIC  
CONSTITUENTS. AN EXCELLENT TECHNIQUE FOR UNIFORMLY  
DEPOSITING SILICON DIOXIDE ONTO GERMANIUM WAS  
OBTAINED.

72

(U)

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/ZOML6

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-613 068  
CRYSTALONICS INC CAMBRIDGE MASS

PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION  
TECHNIQUES AND TO INSURE THE RELIABILITY OF THE C600  
SERIES FIELD EFFECT TRANSISTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 6, 1 OCT-31 DEC  
64.

DEC 64 2SP WILLIAMS, JOHN R.;  
CONTRACT: DA36 039AMCO1483E

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LEGIBLE REPRODUCTION. REPRODUCTION WILL BE MADE IF  
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SALE. SEE ALSO AD-609 596.

DESCRIPTORS: (+TRANSISTORS, MANUFACTURING METHODS),  
(+RELIABILITY (ELECTRONICS), TRANSISTORS), SILICON,  
PROCESSING, BORON, PHOSPHOROUS, DIFFUSION, CHEMICAL  
MILLING, ETCHED CRYSTALS, BONDING, TESTS, DATA  
PROCESSING SYSTEMS, PACKAGING, QUALITY CONTROL (U)  
IDENTIFIERS: C600 TRANSISTORS, PERT (U)

THE PURPOSE OF THIS PROGRAM IS TO IMPROVE THE  
RELIABILITY OF THE C600 SERIES FIELD EFFECT  
TRANSISTORS BY SPECIFIC IMPROVEMENTS OF MANUFACTURING  
TECHNIQUES. THE BASIC PROGRAM HAS BEEN OUTLINED IN  
A PERT PLAN WHICH IS BEING USED AS A REFERENCE.  
IN AN EFFORT TO ACHIEVE THE FAILURE RATE OBJECTIVE,  
THE FOLLOWING PROCESSES ARE TO BE IMPROVED: (1)  
OXIDATION OF SLICES; (2) BORON DIFFUSION OF  
SLICES; (3) MASK ALIGNMENT; (4) ETCHING  
OF SLICES; (5) DIE-TO-HEADER BONDING; (6)  
WIRE BONDING; (7) PACKAGING. (AUTHOR)

(U)

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UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-613 261

BATTELLE MEMORIAL INST COLUMBUS OHIO DEFENSE METALS  
INFORMATION CENTER

METAL REMOVAL BY ELECTROCHEMICAL METHODS AND ITS  
EFFECTS ON MECHANICAL PROPERTIES OF METALS, (U)

JAN 65 45P GURKLIS, JOHN A. ;  
REPT. NO. DMIC-213  
CONTRACT: AF33 615 1121  
PROJ: 8975

UNCLASSIFIED REPORT

DESCRIPTORS: (\*ELECTROEROSIVE MACHINING, METALS),  
(\*CHEMICAL MILLING, METALS), (\*ELECTROLYTIC POLISHING,  
METALS), MECHANICAL PROPERTIES, HYDROGEN EMBRITTLEMENT,  
STEEL, BERYLLIUM, NICKEL ALLOYS, COBALT ALLOYS,  
REFRACTORY METALS, REFRACTORY METAL ALLOYS, TITANIUM  
ALLOYS, SURFACE PROPERTIES, OXIDATION (U)

THIS REPORT ASSEMBLES AND CORRELATES INFORMATION ON  
THE EFFECTS OF ELECTROCHEMICAL METAL-REMOVAL (ECMR)  
PROCESSES ON MECHANICAL PROPERTIES. OF SPECIAL  
INTEREST AND CONCERN ARE THE EFFECTS OF ECMR ON  
FATIGUE STRENGTH. THE REPORT COVERS FOUR  
ELECTROCHEMICAL METAL-REMOVAL PROCESSES:  
ELECTROCHEMICAL MACHINING (ECM), ELECTROLYTIC  
GRINDING (EG), ELECTROCHEMICAL MILLING, AND  
ELECTROPOLISHING. GENERAL CHARACTERISTICS AND  
APPLICATIONS OF THE FOUR METHODS ARE PRESENTED AND  
DISCUSSED; SPECIAL EMPHASIS IS PLACED ON ECM. THE  
ECMR PROCESSES ARE ESPECIALLY USEFUL IN SHAPING  
HIGH-STRENGTH AND DIFFICULT-TO-MACHINE METALS AND  
ALLOYS, AS WELL AS IN SHAPING PARTS WITH UNUSUAL,  
COMPLEX, OR FRAGILE CHARACTERISTICS. (AUTHOR) (U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-613 643

ARMY MATERIALS RESEARCH AGENCY WATERTOWN MASS

THE METALLOGRAPHY OF PYROLITIC GRAPHITE.

(U)

DEC 64 19P TARPINIAN,ARAM :

REPT. NO. AMRA-TR-64-41

PROJ: 1AO10501B010

TASK: 35183

UNCLASSIFIED REPORT

DESCRIPTORS: (PYROLITIC GRAPHITE, MICROSTRUCTURE), ION BOMBARDMENT, ARGON, MERCURY, CHEMICAL MILLING, ELECTROLYTIC POLISHING

(U)

ETCHING OF PYROLYTIC GRAPHITE BY BOTH ARGON ION BOMBARDMENT AND MERCURY ION BOMBARDMENT IS DESCRIBED. THE DIFFERENCE BETWEEN THE MICROSTRUCTURES REVEALED BY THE TWO METHODS IS DISCUSSED, AND AN INTERPRETATION IS SUGGESTED. ARGON ION BOMBARDMENT CREATES A LEAF-LIKE PATTERN REMINISCENT OF STACKED SHINGLES. MERCURY ION BOMBARDMENT REVEALS A LAMINAR STRUCTURE UNLIKE THAT PRODUCED BY ARGON ION BOMBARDMENT. ELECTROCHEMICAL POLISHING AND ETCHING REVEALS MICROSTRUCTURES SIMILAR TO THOSE CREATED BY ION BOMBARDMENT. USING AN ELECTROLYTE BASED ON PHOSPHORIC ACID, MICROSTRUCTURES SIMILAR TO THOSE RESULTING FROM MERCURY ION BOMBARDMENT ARE REVEALED. REPLACING THE PHOSPHORIC ACID WITH NITRIC ACID RESULTS IN MICROSTRUCTURES SIMILAR TO THOSE OBTAINED BY ARGON ION BOMBARDMENT. BASED ON THE CORRELATION BETWEEN MICROSTRUCTURES DEVELOPED BY ION BOMBARDMENT AND ELECTROCHEMICAL ETCHING, IT IS CONCLUDED THAT THE MICROSTRUCTURES REVEALED REPRESENT THE TRUE STRUCTURE. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-614 467

LINDEN LABS INC STATE COLLEGE PA

MACHINING HIGH PURITY ALUMINA.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 2, 1 OCT-31 DEC  
64.

DEC 64 27P MARSHALL, P. A., JR.; INFELD,

J. M. :

CONTRACT: DA36 039AMC03634E

UNCLASSIFIED REPORT

DESCRIPTORS: (\*MACHINING, \*ALUMINA), SURFACE  
PROPERTIES, CHEMICAL MILLING, HYDROCHLORIC ACID,  
HYDROGEN COMPOUNDS, FLUORIDES, ACIDS,  
IMPREGNATION, SILICON COMPOUNDS, DIOXIDES,  
CUTTING TOOLS, DENSITY, HEAT TREATMENT

(U)

IDENTIFIERS: HYDROFLUORIC ACID

(U)

MATERIAL A-96 SELECTED FOR THE MACHINING  
DEMONSTRATION CAN BE DRILLED, GROUNDED, THREADED,  
SLOTTED, TAPPED AND TURNED. THE MATERIAL CAN BE  
READILY REMOVED BY EITHER A GRINDING WHEEL OR A  
SINGLE POINT CUTTING TOOL. CARE MUST BE EXERCISED  
WHEN USING A SINGLE POINT CUTTING TOOL WITH REGARD TO  
FEEDS, SPEEDS, TOOL GEOMETRY, AND CUTTING ANGLES.  
THE CHEMISTRY BEHIND THE ACID TREATING AND THE  
RECONSTITUTION ARE NOT FULLY UNDERSTOOD. THE  
MATERIAL A-96 TREATED ALUMINA APPEARS TO BE ABLE TO  
BE RECONSTITUTED TO A DENSE BODY OF HIGHER PURITY  
THAN THE ORIGINAL BODY. HYDROFLUORIC ACID SEEMS TO  
ATTACK MOST BODIES MORE READILY THAN HYDROCHLORIC  
ACID AND 52% AQUEOUS HF SEEMS TO ATTACK MORE  
READILY THAN 70% AQUEOUS HF. THERE APPEARS TO BE  
SOME OPTIMUM PER CENT AQUEOUS ACID BETWEEN 70% AND  
40%. (AUTHOR)

(U)

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/ZOML6

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UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-614 823

NATIONAL SEMICONDUCTOR CORP DANBURY CONN

PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION  
TECHNIQUES AND INCREASE THE RELIABILITY OF THE  
2N328A TRANSISTOR.

(U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 30 JUN 63-30 DEC 64,

DEC 64 246P RAU,R. R. EDI PAOLA,R. I  
CONTRACT: DA36 039AMCn1480E

UNCLASSIFIED REPORT

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LEGIBLE REPRODUCTION. REPRODUCTION WILL BE MADE IF  
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DESCRIPTORS: (TRANSISTORS, MANUFACTURING METHODS),  
RELIABILITY (ELECTRONICS), PRODUCTION, FAILURE  
(MECHANICS), TESTS, SILICON ALLOYS, PROCESSING,  
SPECIFICATIONS, QUALITY CONTROL, LIFE EXPECTANCY,  
CHEMICAL MILLING, ALUMINUM, VAPOR PLATING, GAS ANALYSIS,  
WELDING, HEATING, FURNACES, INDUSTRIAL EQUIPMENT (U)

A SUMMARY IS GIVEN OF THE WORK PERFORMED FOR  
IMPROVING THE RELIABILITY OF THE PNP SILICON  
ALLOY TRANSISTOR TYPE 2N328A. THE  
FOLLOWING PROCESSES WERE MODIFIED DURING THE COURSE  
OF THE CONTRACT: AN ETCH WHEEL WAS INTRODUCED TO  
MORE ACCURATELY CONTROL FINAL DEVICE ETCHING;  
ADDITIONAL BAKE-OUT FURNACES WERE INTRODUCED AND  
EVALUATED TO INCREASE THE AMOUNT OF TIME WHICH THE  
UNITS ARE HEATED AFTER ETCHING; A GAS RECIRCULATOR  
WAS INTRODUCED INTO THE FINAL DRY LINE TO REDUCE THE  
WATER VAPOR CONCENTRATION; WELDING SHIELDS WERE  
INTRODUCED AT TWO WELDING OPERATIONS WHILE ONE OTHER  
PROCESS WAS MODIFIED; ALL THESE CHANGES WERE MADE IN  
ORDER TO DECREASE THE AMOUNT OF WELD SPLASH STRIKING  
THE ACTIVE REGION OF THE TRANSISTOR. DEVICES  
PRODUCED FOR THE FIRST MONTH OF OPERATION OF THE  
IMPROVED MANUFACTURING LINE WERE USED FOR THE LONG  
TERM RELIABILITY TESTING. MEASUREMENTS ON DEVICES  
MADE DURING THIS PERIOD OF MANUFACTURE ARE INCLUDED.  
THIS RELIABILITY EVALUATION CONSISTED OF  
OPERATIONAL TESTS FOR A 1000 HOURS AT POWER LEVELS OF  
400, 450, AND 500 MILLIWATTS; A SPECIFICATION FOR  
AN IMPROVED 2N328A TYPE TRANSISTOR INCORPORATING  
SOME OF THE RESULTS OF EVALUATIONS MADE DURING THIS  
CONTRACT IS INCLUDED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-616 786

RENSSELAER POLYTECHNIC INST TROY N Y

PRINCIPLES OF METALLOGRAPHIC ETCHING.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
JUN 65 26P GREENE,NORBERT D. FRUDAW,  
PETER S. LEE,LINDA;  
REPT. NO. TR-2  
CONTRACT: NONR59117

UNCLASSIFIED REPORT

DESCRIPTORS: (\*CHEMICAL MILLING, ALLOYS),  
(\*METALLOGRAPHY, CHEMICAL MILLING), TIN ALLOYS,  
ZINC ALLOYS, SODIUM COMPOUNDS, HYDROXIDES,  
ELECTROLYTES, ANALYSIS

(U)

THE PRINCIPLES OF METALLOGRAPHIC ETCHING HAVE BEEN DETERMINED BY ELECTROCHEMICAL AND OPTICAL MEASUREMENTS ON TIN-ZINC ALLOYS IN SODIUM HYDROXIDE ELECTROLYTES. THE MINIMUM DISSOLUTION RATE RATIO AND THE MINIMUM AMOUNT OF SELECTIVE DISSOLUTION NECESSARY TO ACHIEVE METALLOGRAPHIC CONTRAST OF PHASES HAVE BEEN MEASURED. ETCHING RATE AND CONTRAST ARE UNIQUELY DEFINED BY ETCHING POTENTIAL BY POTENTIOSTATIC, ELECTROLYTIC AND CHEMICAL ETCHING METHODS. (AUTHOR

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-613 628

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

CHEMICAL MILLING,

(U)

JUL 65 7P RYBAK, P. T.; SAVICH, V. V. ;  
REPT. NO. FTD-TT-65-865  
MONITOR: TT . 65-62694

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: UNEDITED ROUGH DRAFT TRANS. OF  
MASHINOSTROITEL' (USSR) N3 P34-5 1964. AVAILABLE COPY  
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AVAILABLE FOR PUBLIC SALE.

DESCRIPTORS: (\*CHEMICAL MILLING, MANUFACTURING  
METHODS), USSR, PRINTED CIRCUITS, HEATING,  
INFRARED RADIATION, AUTOMATION

(U)

TRANSLATION OF RUSSIAN RESEARCH: CHEMICAL MILLING.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD#619 295

MOTOROLA INC PHOENIX ARIZ SEMICONDUCTOR PRODUCTS DIV

PRODUCTION ENGINEERING MEASURE FOR SILICON OVERLAY  
TRANSISTORS.

(U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 1, 1 JAN-  
31 MAR 65,

MAR 65 52P KEARKUFF, THOMAS;  
CONTRACT: U436 039AMC06156E  
PROJ: 74001

UNCLASSIFIED REPORT

DESCRIPTORS: (\*TRANSISTORS, MANUFACTURING METHODS),  
(\*SILICON, TRANSISTORS), DIFFUSION, GOLD,  
CHEMICAL MILLING, PRECISION FINISHING, PROCESSING,  
ENCAPSULATION, BONDING, GLASS, WIRE, STORAGE,  
EPITAXIAL GROWTH, RELIABILITY(ELECTRONICS) (U)

NEW BASE PREDEPOSITION AND BASE DIFFUSION SYSTEMS  
WERE PUT INTO PRODUCTION AND EVALUATED. WORK WAS  
STARTED ON A NEW Emitter AND GOLD DIFFUSION PROCESS.  
WORK WAS STARTED ON THE Emitter STRIPE WIDTH  
EVALUATION. CHEMICAL ETCHING WAS PLACED INTO  
PRODUCTION AND WORK ON SLURRY POLISHING IS ALMOST  
COMPLETE. A NEW PHOTORESIST WAS EVALUATED AND  
PRODUCTION CONTROLS ARE PRESENTLY BEING APPLIED.  
NEW ASSEMBLY PARTS AND PROCESSES WERE EVALUATED  
FROM THE ASSEMBLY VIEWPOINT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-62U 508  
BATTELLE MEMORIAL INST COLUMBUS OHIO

MACHINING AND GRINDING OF TITANIUM AND ITS  
ALLOYS.

(U)

DESCRIPTIVE NOTE: NASA TECHNICAL MEMO,  
AUG 65 131P OLOFSON, C. T. BOULGER, F. W.  
GURKLIS, J. A. I  
CONTRACT: DAOI D2;AMCI1651Z  
MONITOR: NASA,RSIC TM-X-53312,409

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SUBCONTRACTED TO REDSTONE  
SCIENTIFIC INFORMATION CENTER, REDSTONE ARSENAL,  
ALA.

DESCRIPTORS: (\*TITANIUM, MATERIAL REMOVAL),  
(\*TITANIUM ALLOYS, MATERIAL REMOVAL), (\*MATERIAL  
REMOVAL, TITANIUM), MACHINING, MACHINE TOOLS,  
GRINDERS, PRECISION FINISHING, CHEMICAL MILLING,  
CUTTING TOOLS, PERFORMANCE(ENGINEERING) (U)

THE REPORT COVERS THE STATE OF THE ART OF METAL-  
REMOVAL OPERATIONS FOR TITANIUM AND ITS ALLOYS. IT  
DESCRIBES THE METHODS CURRENTLY EMPLOYED FOR  
CONVENTIONAL MACHINING, GRINDING, ELECTROLYTIC, AND  
CHEMICAL MACHINING PROCESSES. THE PRECAUTIONS WHICH  
SHOULD BE TAKEN TO AVOID TROUBLES RESULTING FROM THE  
CHARACTERISTICS TYPICAL OF TITANIUM ARE POINTED OUT.  
TEN MACHINING, TWO GRINDING, TWO CUTTING, AND TWO  
UNCONVENTIONAL METAL-REMOVAL OPERATIONS ARE DISCUSSED  
SEPARATELY. IN OTHER SECTIONS, THE MECHANICS OF  
CHIP-FORMING PROCESSES, THE RESPONSE TO MACHINING  
VARIABLES, COSTS, AND PRECAUTIONS DESIRABLE FROM THE  
STANDPOINT OF SAFETY ARE DISCUSSED. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-621 454  
HARSHAW CHEMICAL CO CLEVELAND OHIO

RESEARCH ON PHOTOVOLTAIC CELLS.

(U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 1 MAY 62-30 APR 65.  
JUN 65 12SP HEYERDAHL, NORMAN E. HARVEY,  
DONALD J. I  
CONTRACT: AF33 657 7916  
PROJ: 7885  
TASK: 788502  
MONITOR: ARL 65-111

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SOLAR CELLS, SEM CONDUCTING FILMS),  
(\*SEMICONDUCTING FILMS, SOLAR CELLS), CADMIUM  
COMPOUNDS, SULFIDES, SELENIUM, CADMIUM ALLOYS,  
SELENIUM ALLOYS, TELLURIUM ALLOYS, ZINC ALLOYS,  
GALLIUM ALLOYS, ARSENIC ALLOYS, CHEMICAL MILLING,  
VAPOR PLATING, MAGNETIC PROPERTIES, ELECTRICAL  
PROPERTIES, THERMOELECTRICITY, LIGHT  
TRANSMISSION

(U)

IDENTIFIERS: THIN FILMS

(M)

THE REPORT DESCRIBES RESEARCH AND DEVELOPMENT ON  
THIN FILM SOLAR BATTERIES. THE FABRICATION AND  
STUDY OF THIN FILMS OF CDS:SE, CdSe,  
CdTe, ZNSE, AND GaAs AND THIN FILM SOLAR  
BATTERIES OF CDS:SE, CdSe, AND CdTe IS  
DISCUSSED IN DETAIL. A STUDY OF THE ETCHING  
BEHAVIOR OF II-VI COMPOUNDS, COMPLETED AS A PART  
OF THIS PROGRAM, HAS BEEN PUBLISHED ELSEWHERE. AN  
ABSTRACT OF THE WORK IS INCLUDED IN THIS REPORT.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD-622 879

TRW SEMICONDUCTORS INC LAWNDALE CALIF RESEARCH AND  
DEVELOPMENT DEPT

TRANSISTOR, VHF, SILICON, POWER (10W-500MC). (U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 1 JUL 63-15 JAN 65,  
JAN 65 12UP CLARKE,R. N. SCRISHAL,J. I

REPT. NO. 59-RD-F

CONTRACT: DA36 039AMC03189E

PROJ: 1P6 22001A056

TASK: 1P6 22001A056 01

UNCLASSIFIED REPORT

DESCRIPTORS: (TRANSISTORS, SILICON), VERY HIGH  
FREQUENCY, RADIOFREQUENCY POWER, CRYSTALS,  
PROCESSING, PACKAGING, CHEMICAL MILLING,  
DIFFUSION, SILICONE PLASTICS, VAPOR PLATING,  
METAL FILMS

(U)

THE TRANSISTOR PRODUCES 10 WATTS AT 500 MC WITH 5-6  
DB OF POWER GAIN AND 30-40% COLLECTOR EFFICIENCY.  
THE CRYSTAL WAS ORIGINALLY DESIGNED ACCORDING TO  
PRESENT POWER GAIN THEORY, BUT IT ONLY HAD ONE TO TWO  
DB OF POWER GAIN AT 500 MC. THE SECOND CRYSTAL  
DESIGN WAS BASED UPON THE SMALLEST PRACTICAL PATTERN  
DIMENSIONS, OR A 0.1 MIL MINIMUM SPACING. THE  
REDESIGNED PATTERN ALSO HAD PROVISION FOR ANALYZING  
THE TRANSISTOR IN MULTIPLES OF SUB CELLS AS WELL AS  
IN ITS ENTIRETY. SUCH AN ANALYSIS SHOWED THE  
NECESSITY OF SYMMETRY OF BASE FEED IN COMMON Emitter  
AMPLIFIERS TO GET ALL THE CELLS WORKING TOGETHER.  
PARALLELING OF CELLS ALSO INDICATED AN APPARENT  
LOSS IN F SUB T WITH INCREASED SIZE. PROCESSING  
AND ASSEMBLY WAS GENERALLY ALONG STANDARD INDUSTRY  
PRACTICE EXCEPT IN THE AREA OF PHOTORESIST. THERE,  
IMPROVED GLASS MASKS WERE USED, ALONG WITH THE NEW  
KTFR PHOTORESIST. SUCCESSFUL ETCHING OF FINE  
METALLIZED PATTERNS WAS ACCOMPLISHED THROUGH THE  
DEVELOPMENT OF A JET ETCHING TECHNIQUE. TO RETAIN  
AS MUCH OF THE INNATE CRYSTAL PERFORMANCE CAPABILITY  
AS POSSIBLE, CONSIDERABLE WORK WAS DONE ON PACKAGING.  
IT WAS CONCLUDED THAT NO AVAILABLE PACKAGE WAS  
TRULY ADEQUATE. THE REST AVAILABLE FOR THE R.F.  
PERFORMANCE IS THE SILICONE MOLDED PACKAGE DUE TO ITS  
SHORT, LOW-LOSS LEADS.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-625 317 9/1 13/8  
MOTOROLA INC PHOENIX ARIZ SEMICONDUCTOR PRODUCTS DIV

PRODUCTION ENGINEERING MEASURE FOR SILICON OVERLAY  
TRANSISTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 2, 1 APR-  
30 JUN 65,  
JUN 65 31P CASSIDY, MICHAEL ; GREER, PAUL  
;  
CONTRACT: DA-36-U39-AMC-06156(E)  
PROJ: DA-74001

UNCLASSIFIED REPORT

DESCRIPTORS: (\*TRANSISTORS, MANUFACTURING METHODS),  
(\*SILICON, TRANSISTORS), DIFFUSION, GOLD,  
CHEMICAL MILLING, PRECISION FINISHING,  
PROCESSING, ENCAPSULATION, BONDING, GLASS,  
WIRE, EPITAXIAL GROWTH,  
RELIABILITY(ELECTRONICS), QUALITY CONTROL (U)

PROGRESS DURING THE REPORT PERIOD CONSISTED OF THE FOLLOWING: (1) FABRICATION OF DEVICES USING THE BORON TRIBROMIDE (BBR3) BASE DIFFUSION METHOD. WAFERS ARE ALSO IN PROCESS USING A COMBINATION OF THE BBR3 BASE DIFFUSION AND THE Emitter-GOLD Emitter Diffusion. (2) TRANSITION TO 2-INCH MASKS TO GIVE BETTER DEFINITION AND DETAIL. MASK MEASUREMENT BY PRECISE METHODS TO INSURE MASK ACCURACY AND REPEATABILITY. (3) EVALUATION OF EFFECTS OF VARIATIONS IN Emitter STRIPE WIDTH. (4) FABRICATION OF WAFERS USING THE CHEMICAL ETCH PROCESS. (5) CONSTRUCTION OF WAFER STORAGER CABINET TO DETERMINE EFFECTS OF PROLONGED WAFER STORAGE BETWEEN VARIOUS PROCESS STEPS. (6) CONTINUED INVESTIGATION OF ULTRASONIC WIRE BONDING AND ANALYSIS OF THE RESULTS OBTAINED BY ULTRASONIC BONDING TO RAW KOVAR TOP POSTS. (7) DEVELOPMENT OF A PROCESS EVALUATION TEST PLAN AND AN ENVIRONMENTAL STEP STRESS TEST PLAN. COMPLETION OF INITIAL ELECTRICAL PARAMETER READOUTS. EVALUATION OF SAMPLES FABRICATED USING THE BBR3 BASE DIFFUSION METHOD. (AUTHOR) (U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-628 230 9/1 13/8  
MOTOROLA INC PHENIX ARIZ SEMICONDUCTOR PRODUCTS DIV

PRODUCTION ENGINEERING MEASURE FOR SILICON OVERLAY  
TRANSISTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 3, 1 JUL-  
30 SEP 65,

SEP 65 32P KEARKUFF, THOMAS ; GREER, PAUL

;

CONTRACT: DA-36-039-AMC-06156(E),

PROJ: DA-74001.

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-625 317.

DESCRIPTORS: (\*TRANSISTORS, MANUFACTURING METHODS),  
(\*SILICON, TRANSISTORS), DOPING, GOLD, CHEMICAL  
MILLING, PRECISION FINISHING, PROCESSING,  
ENCAPSULATION, ULTRASONIC RADIATION, BONDING,  
WIRE, ASSEMBLING, RELIABILITY(ELECTRONICS) (U)

PROGRESS DURING THE REPORTING PERIOD CONSISTED OF  
THE FOLLOWING: (1) DIFFUSION SYSTEMS. WORK WAS  
COMPLETED ON THE BBR3 BASE DIFFUSION SYSTEM, AND  
SYSTEM FEASIBILITY WAS DETERMINED. THE Emitter-  
GOLD Emitter DIFFUSION SYSTEM WAS ALSO EVALUATED FOR  
FEASIBILITY. (2) WAFER PROCESSING. THE  
FEASIBILITY OF USING 1 1/2 INCH WAFERS WITH SLURRY  
POLISH AND CHEMICAL ETCH WAS INVESTIGATED. (3)  
WAFER STORAGE. DEVICES WHICH HAD BEEN STORED IN  
N2 FOR 15 DAYS AT VARIOUS STEPS WERE PROCESSED AND  
EVALUATED. (4) ASSEMBLY PROCESSING. UNITS WERE  
CONSTRUCTED USING ULTRASONIC WIRE BONDING OF ALUMINUM  
WIRE TO BARE KOVAR POSTS AND DEIONIZED WATER BOILING  
PRIOR TO ENCAPSULATION. (5) RELIABILITY.  
COMPLETED UNITS WERE EVALUATED. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-628 230 9/1 13/8  
MOTOROLA INC PHENIX ARIZ SEMICONDUCTOR PRODUCTS DIV

PRODUCTION ENGINEERING MEASURE FOR SILICON OVERLAY  
TRANSISTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 3, 1 JUL-  
30 SEP 65,  
SEP 65 32P KEARKUFF, THOMAS ; GREER, PAUL

CONTRACT: DA-36-039-AMC-06156(E),  
PROJ: DA-74001.

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-625 317.

DESCRIPTORS: (\*TRANSISTORS, MANUFACTURING METHODS),  
(\*SILICON, TRANSISTORS), DOPING, GOLD, CHEMICAL  
MILLING, PRECISION FINISHING, PROCESSING,  
ENCAPSULATION, ULTRASONIC RADIATION, BONDING,  
WIRE, ASSEMBLING, RELIABILITY(ELECTRONICS) (U)

PROGRESS DURING THE REPORTING PERIOD CONSISTED OF  
THE FOLLOWING: (1) DIFFUSION SYSTEMS. WORK WAS  
COMPLETED ON THE BBR3 BASE DIFFUSION SYSTEM, AND  
SYSTEM FEASIBILITY WAS DETERMINED. THE Emitter-  
GOLD Emitter DIFFUSION SYSTEM WAS ALSO EVALUATED FOR  
FEASIBILITY. (2) WAFER PROCESSING. THE  
FEASIBILITY OF USING 1 1/2 INCH WAFERS WITH SLURRY  
POLISH AND CHEMICAL ETCH WAS INVESTIGATED. (3)  
WAFER STORAGE. DEVICES WHICH HAD BEEN STORED IN  
N2 FOR 15 DAYS AT VARIOUS STEPS WERE PROCESSED AND  
EVALUATED. (4) ASSEMBLY PROCESSING. UNITS WERE  
CONSTRUCTED USING ULTRASONIC WIRE BONDING OF ALUMINUM  
WIRE TO BARE KOVAR POSTS AND DEIONIZED WATER BOILING  
PRIOR TO ENCAPSULATION. (5) RELIABILITY.  
COMPLETED UNITS WERE EVALUATED. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD#631 952 13/8  
NAVAL AIR ENGINEERING CENTER PHILADELPHIA PA AERONAUTICAL  
MATERIALS LAB

CHEMICAL MILLING OF ALLOY STEELS,

(U)

MAR 66 23P KETCHAM,SARA J. ;  
REPT. NO. NAEC-AML-2418,  
PROJ: RRMA-02-011/200-1/F020-01-01

UNCLASSIFIED REPORT

- - -

DESCRIPTORS: (\*CHEMICAL MILLING, \*STEEL), HYDROGEN  
EMBRITTLEMENT, STRESS CORROSION,

FRACTURE(METALLURGY), SURFACE PROPERTIES

(U)

IDENTIFIERS: STEEL H-11, STEEL 4340, STAINLESS  
STEEL 17-7PH

(U)

EXPERIMENTS WERE CONDUCTED TO DETERMINE THE EFFECT  
OF CHEMICAL MILLING ON SUSCEPTIBILITY OF HIGH  
STRENGTH STEELS TO HYDROGEN EMBRITTLEMENT AND STRESS  
CORROSION CRACKING. ALLOYS STUDIED INCLUDED H-  
11, 4340 AND 17-7 PH. RESULTS INDICATED THAT THE  
ACID BATHS USED FOR CHEMICAL MILLING DO INITIALLY  
EMBRITTLE THESE ALLOYS, BUT RECOVERY OF DUCTILITY  
TAKES PLACE AT ROOM TEMPERATURE WITHIN ONE WEEK IF  
THERE IS NO BARRIER TO THE ESCAPE OF HYDROGEN (SUCH  
AS A PLATING). A RECOVERY TREATMENT OF 48 HOURS AT  
ROOM TEMPERATURE FOLLOWED BY 4 HOURS AT 375F IS  
RECOMMENDED. A HIGH STRENGTH STEEL WITH A CHEM-  
MILLED SURFACE IS MORE SUSCEPTIBLE TO STRESS  
CORROSION CRACKING THAN ONE WITH A MACHINE GROUND  
SURFACE. (AUTHOR)

(U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-634 075 13/8 11/6 13/9  
BATTELLE MEMORIAL INST COLUMBUS OHIO

MACHINING AND GRINDING OF NICKEL-AND COBALT-BASE ALLOYS.

(U)

APR 66 146P OLOFSON, C. T. GURKLIS, J. A.  
BOULGER, F. W.;  
CONTRACT: DA-01-021-AMC-11651(Z),  
MONITOR: NASA RSIC TM-X-53446 ,482

UNCLASSIFIED REPORT

DESCRIPTORS: (\*NICKEL ALLOYS, MATERIAL REMOVAL), (\*COBALT ALLOYS, MATERIAL REMOVAL), (\*MATERIAL REMOVAL, STATE-OF-THE-ART REVIEWS), MACHINING, GRINDERS, CHEMICAL MILLING, ELECTROEROSIVE MACHINING, CUTTING, CUTTING TOOLS, DRILLING, MACHINE SHOP PRACTICE, MACHINE TOOLS, MILLING MACHINES, REAMERS, LATHES, CUTTING FLUIDS, DRILLING MACHINES, PRECISION FINISHING, ABRASIVES, GRINDING, ELECTROLYTES, CLEANING, FRICTION, HEAT-RESISTANT METALS + ALLOYS, CORROSION-RESISTANT ALLOYS, MECHANICAL PROPERTIES, COPPER ALLOYS, IRON ALLOYS, CHROMIUM ALLOYS, CASTING ALLOYS

(U)

THE REPORT COVERS THE STATE OF THE ART OF METAL-REMOVAL OPERATIONS FOR NICKEL AND COBALT-BASE ALLOYS. IT DESCRIBES THE METHODS CURRENTLY EMPLOYED FOR CONVENTIONAL MACHINING, GRINDING, ELECTROLYTIC, AND CHEMICAL-MACHINING PROCESSES. THE PRECAUTIONS THAT SHOULD BE TAKEN TO AVOID TROUBLES RESULTING FROM THE CHARACTERISTICS TYPICAL OF THESE ALLOYS ARE POINTED OUT. NINE MACHINING, TWO GRINDING, TWO CUTTING, AND TWO UNCONVENTIONAL METAL-REMOVAL OPERATIONS ARE DISCUSSED SEPARATELY. OTHER SECTIONS DISCUSS THE CLASSIFICATION OF THESE ALLOYS AND THEIR GENERAL RESPONSE TO MACHINING VARIABLES.

(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-634 392 13/8 20/2  
NAVAL ORDNANCE LAB WHITE OAK MD

POLISHES AND ETCHES FOR TIN TELLURIDE, LEAD SULFIDE,  
LEAD SELENIDE, AND LEAD TELLURIDE: SUPPLEMENT. (U)

DESCRIPTIVE NOTE: FINAL REPT. JUN 63-FEB 66,  
MAR 66 ISP NORR, MARRINER K.;  
REPT. NO. NOLTR-66-32.  
PROJ: FR-46,

UNCLASSIFIED REPORT

DESCRIPTORS: (\*CHEMICAL MILLING, CRYSTALS),  
(\*ETCHING, CRYSTALS), (\*ELECTROLYTIC POLISHING,  
CRYSTALS), (\*CRYSTALS, PRECISION FINISHING), TIN  
ALLOYS, TELLURIUM ALLOYS, LEAD ALLOYS, LEAD  
COMPOUNDS, SULFIDES, SELENIUM ALLOYS,  
INTERMETALLIC COMPOUNDS, CRYSTAL LATTICE  
DEFECTS (U)

IDENTIFIERS: ETCHES, POLISHES, TIN TELLURIDE,  
LEAD SULFIDE, LEAD SELENIDE, LEAD TELLURIDE (U)

THIS REPORT IS A CONTINUATION OF NOLTR 63-156  
(AD-423 367). TOGETHER, THE TWO REPORTS PRESENT A  
REVIEW OF CHEMICAL AND ELECTROLYTIC POLISHES AND  
DISLOCATION ETCHES FOR SNT, PBS, PBSE,  
AND PATE, COVERING THE PERIOD FROM 1907 THROUGH  
1965. THE PRESENT REPORT ALSO DESCRIBES A NEW  
POLISH AND A NEW DISLOCATION ETCH FOR TIN TELLURIDE,  
AS WELL AS TESTS ON AND IMPROVEMENTS IN SOME OF THE  
POLISHES REPORTED IN EARLIER PUBLICATION.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-635 814 9/1 13/8  
MOTOROLA INC PHOENIX ARIZ SEMICONDUCTOR PRODUCTS DIV

PRODUCTION ENGINEERING MEASURE FOR SILICON OVERLAY  
TRANSISTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 4, 1 OCT-  
31 DEC 65.

DEC 65 37P CASSIDY, MICHAEL ;GREER,PAUL

:

CONTRACT: DA-36-039-AMC-06156(E),  
PROJ: DA-7401,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-635 118.

DESCRIPTORS: (\*TRANSISTORS, MANUFACTURING METHODS),  
(\*SILICON, TRANSISTORS), DISKS, PREPARATION,  
BONDING, DIFFUSION, STORAGE,  
RELIABILITY(ELECTRONICS), ULTRASONIC WELDING,  
CHEMICAL MILLING, ETCHING, ELECTRIC TERMINALS (U)

PROGRESS DURING THE PAST QUARTER HAS CONSISTED OF  
THE FOLLOWING: (1) WAFER PREPARATION:  
PROCESSING OF 1 1/2-INCH SLURRY-POLISHED AND  
CHEMICALLY ETCHED WAFERS USING THE NEW PREOHMIC TWO-  
STEP PHOTORESIST PROCESS. (2) MASK RESOLUTION  
AND ALIGNMENT: VERTICAL AND HORIZONTAL  
DIMENSIONAL INSPECTION OF MASKS TO ELIMINATE MASK  
VARIATIONS. (3) DEIONIZED WATER BOIL:  
EVALUATION OF ULTRASONICALLY WIRE-BONDED DEVICES  
AFTER SUBJECTION TO DEIONIZED WATER BOIL. (4)  
WIRE BONDING: EVALUATION OF UNITS FABRICATED  
USING A SONO ROND ULTRASONIC BONDER. (5)  
DIFFUSION SYSTEMS: FINAL EVALUATION OF THE  
BCL3 SYSTEM, Emitter DIFFUSION EMPLOYING A  
CONTROLLED POCL3 SOURCE TEMPERATURE. (6)  
RELIABILITY EVALUATION: EVALUATION OF COMPLETED  
UNITS. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-639 654 13/8 13/9  
BATTELLE MEMORIAL INST COLUMBUS OHIO

MACHINING AND GRINDING OF ULTRAHIGH-STRENGTH STEELS  
AND STAINLESS STEEL ALLOYS. (U)

UCT 65 214P OLOFSON,C. T. ;GURKLIS,J. A. ;  
BGULGER,F. W. ;  
CONTRACT: DA-01-021-AMC-11651(Z),  
MONITOR: NASA ,RSIC TM-X-53433 ,501

UNCLASSIFIED REPORT

DESCRIPTORS: (\*STEEL, \*MATERIAL REMOVAL),  
(\*MACHINING, STEEL), (\*GRINDING, STEEL),  
STAINLESS STEEL, STATE-OF-THE-ART REVIEWS, CHEMICAL  
MILLING, MACHINE TOOLS, CUTTING FLUIDS, CUTTING  
TOOLS, SMALL TOOLS (U)

THE REPORT COVERS THE STATE OF THE ART OF METAL-  
REMOVAL OPERATIONS FOR STAINLESS AND ULTRAHIGH-  
STRENGTH STEELS. IT DESCRIBES THE METHODS  
CURRENTLY EMPLOYED FOR CONVENTIONAL MACHINING,  
GRINDING, ELECTROLYTIC, ELECTRIC-DISCHARGE, AND  
CHEMICAL-MACHINING PROCESSES. THE PRECAUTIONS THAT  
SHOULD BE TAKEN TO AVOID TROUBLES RESULTING FROM THE  
CHARACTERISTICS TYPICAL OF THESE ALLOYS ARE POINTED  
OUT. NINE MACHINING, TWO GRINDING, TWO CUTTING,  
AND THREE UNCONVENTIONAL METAL-REMOVAL OPERATIONS ARE  
DISCUSSED SEPARATELY. OTHER SECTIONS DISCUSS THE  
CLASSIFICATION OF THESE ALLOYS AND THEIR GENERAL  
RESPONSE TO MACHINING VARIABLES. (AUTHOR) (U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-648 980 13/8  
NAVAL AIR MATERIAL CENTER PHILADELPHIA PA AERONAUTICAL  
MATERIALS LAB

CHEMICAL MILLING OF METALS AND ALLOYS; ITS EFFECT ON  
STRESS CORROSION SUSCEPTIBILITY AND HYDROGEN  
EMBRITTLEMENT.

(U)

MAY 61 4P KETCHAM, S. J.;  
REPT. NO. NAMC-AML-1236

UNCLASSIFIED REPORT

DESCRIPTORS: (\*CHEMICAL MILLING, \*ALUMINUM  
ALLOYS), (\*STEEL, CHEMICAL MILLING),  
(\*CORROSION-RESISTANT ALLOYS, TITANIUM),  
DEGRADATION, HYDROGEN EMBRITTLEMENT, TEMPERATURE,  
SOLUTIONS, SURFACE PROPERTIES

(U)

IDENTIFIERS: ALUMINUM ALLOY 2024, ALUMINUM ALLOY  
7075, ALUMINUM ALLOY X2020

(U)

THE PAPER CONTAINS SPECIFICATIONS TO CONTROL THE  
SOLUTIONS AND PROCESSES FOR THE VARIOUS METALS AND  
ALLOYS. A METHOD FOR DETERMINING WHETHER ANY STEP  
IN THE PROCESS CAN ACCELERATE STRESS CORROSION IN  
ALUMINUM ALLOYS AND CORROSION RESISTING STEELS, OR  
CAUSE HYDROGEN EMBRITTLEMENT IN STEEL AND TITANIUM  
ALLOYS SUSCEPTIBLE TO SUCH EMBRITTLEMENT, IS DESIRED  
FOR INCORPORATION INTO THE SPECIFICATION AS WELL AS  
ESTABLISHMENT OF CRITERIA FOR ASSESSING THE SEVERITY  
OF SUCH EFFECTS. THE PROJECT CONTAINS:  
ALUMINUM ALLOYS; STEELS; TITANIUM ALLOYS.  
(AUTHOR)

(U)

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UNCLASSIFIED

/ZOML6

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-674 U66 11/6 13/8  
BATTELLE MEMORIAL INST COLUMBUS OHIO DEFENSE METALS  
INFORMATION CENTER

A REVIEW OF METALLOGRAPHIC PREPARATION PROCEDURES FOR  
BERYLLIUM AND BERYLLIUM ALLOYS, (U)

JUN 68 2UP PRICE, C. W. MCCALL, J.  
L. I.  
REPT. NO. DMIC-MEMO-237  
CONTRACT: F33615-68-C-1325

UNCLASSIFIED REPORT

DESCRIPTORS: (\*BERYLLIUM, METALLOGRAPHY),  
(\*BERYLLIUM ALLOYS, METALLOGRAPHY), REVIEWS,  
ELECTRON MICROSCOPY, FINISHES + FINISHING,  
GRINDING, ETCHING, CUTTING, MACHINING,  
CHEMICAL MILLING (U)

THE MEMORANDUM IS DIVIDED INTO FOUR TOPICS:  
(1) GRINDING, (2) POLISHING, (3)  
ETCHING, AND (4) THINING FOR TRANSMISSION  
ELECTRON MICROSCOPY. PROCEDURES REVIEWED ARE ALSO  
LISTED IN TABULAR FORM FOR READY REFERENCE. IN  
ADDITION TO REVIEWING PUBLISHED REFERENCES, THE  
AUTHORS HAVE INCLUDED A CONSIDERABLE AMOUNT OF  
PREVIOUSLY UNPUBLISHED DATA BASED ON THEIR OWN  
EXPERIENCE AND PRIVATE COMMUNICATION WITH ASSOCIATES  
IN THE FIELD. (AUTHOR) (U)

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UNCLASSIFIED

/ZOML6

UNCLASSIFIED

LDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-677 066 11/6 13/8  
GENERAL DYNAMICS/CONVAIR SAN DIEGO CALIF

REDUCING HAND STRAIGHTENING BY CHEM-MILLING 7075  
AND 7178 ALUMINUM ALLOY IN THE "W" (OR  
NATURALLY AGED) CONDITION.

(U)

DESCRIPTIVE NOTE: FINAL REPT.,  
OCT 60 23P WHITING H. A. (PLUMMER, C.  
E. I  
REPT. NU. GDC-PR919

UNCLASSIFIED REPORT

DESCRIPTORS: +ALUMINUM ALLOYS, +CHEMICAL  
MILLING, ETCHING, SURFACE ROUGHNESS, FINISHES  
+ FINISHING, AGING(MATERIALS),  
PANELS(STRUCTURAL), MECHANICAL WORKING,  
TOLERANCES(MECHANICS)

(U)

IDENTIFIERS: ALUMINUM ALLOY 7075, ALUMINUM ALLOY  
7178

(U)

THE OBJECTIVE AND PURPOSE OF THE PROJECT WAS TO  
ETCH 7075 AND 7178 ALUMINUM ALLOYS, 0.125 IN. THICK,  
IN THE "W" (OR NATURALLY AGED CONDITION). A  
MAXIMUM SURFACE ROUGHNESS (RMS) OF 125 MICROINCHES  
WAS NOT TO BE EXCEEDED.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-677 494 11/6 13/8  
GENERAL DYNAMICS/ASTRONAUTICS SAN DIEGO CALIF

STRIPPING PT201 THERMOSETTING RESIN COATINGS FROM  
321 ANNEALED STAINLESS STEEL SURFACES,  
(PROPELLANT UTILIZATION MANOMETER HOUSINGS). (U)

SEP 61 1SP SHIWANOV, E. ;  
REPT. NO. GDA-AN61AMR4062

UNCLASSIFIED REPORT

DESCRIPTORS: (\*STAINLESS STEEL, \*CHEMICAL  
MILLING), THERMOSETTING PLASTICS, SULFURIC ACID,  
ULTRASONIC RADIATION, STAINLESS STEEL, REMOVAL,  
SURFACES, MANOMETERS, CLEANING, PLASTIC COATINGS (U)

THE REPORT DISCUSSES THE DEVELOPMENT OF A NEW  
CHEMICAL STRIPPER. IT WAS FOUND THAT THE USE OF  
SULFURIC ACID IN COMBINATION WITH ULTRASONIC  
VIBRATION (40KC.) WAS AN EFFICIENT METHOD TO  
STRIP AND DISINTEGRATE PT201 THERMOSETTING RESIN  
FROM THE SURFACE OF MANOMETER HOUSINGS. THREE SUCH  
HOUSINGS WERE EFFECTIVELY CLEANED BY THIS METHOD  
WITHIN A PERIOD OF TEN MINUTES AND WERE IN ACCORDANCE  
WITH THE REQUIREMENTS OF MS 60-14BA,  
MAINTENANCE CLEANING OF PROPELLANT  
UTILIZATION MANOMETERS. (AUTHOR) (U)

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UNCLASSIFIED

/ZOML6

UNCLASSIFIED

DUC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AU-678 154 : 13/8 13/13 11/6  
GENERAL DYNAMICS/CONVAIR SAN DIEGO CALIF

CHEM-MILL PROCESS FOR CONTOURING ALUMINUM  
HONEYCOMB CORE.

(U)

DESCRIPTIVE NOTE: FINAL REPT.,  
NOV 60 77P GLENSKIE, F. J. ;  
REPT. NO. GDC-PR-920

UNCLASSIFIED REPORT

DESCRIPTORS: (\*HONEYCOMB CORES, \*CHEMICAL  
MILLING), (\*ALUMINUM ALLOYS, CHEMICAL MILLING),  
BONDING, PRESSURE, THICKNESS,  
PANELS(STRUCTURAL), SANDWICH CONSTRUCTION,  
COSTS, FLEXURAL STRENGTH, SPECIFICATIONS,  
MASKING, FEASIBILITY STUDIES

(U)

CONTOURING ALUMINUM HONEYCOMB CORE BY MECHANICAL  
MEANS IS DIFFICULT AND EXPENSIVE. A REVOLUTIONARY  
METHOD OF CONTOURING BY CHEMICAL MILLING HAS BEEN  
INVENTED. THIS PROCESS HAS BEEN SUCCESSFULLY  
APPLIED TO 1/4 INCH CELL-SIZED CORES. THE PROBLEM  
WAS TO CONTOUR 1/8 INCH CELL-SIZED CORES, SINCE THIS  
IS A PRODUCTION ITEM. THIS PROJECT WAS AN ATTEMPT  
TO ADAPT THE PROCESS TO 1/8 INCH CELL-SIZED CORES.  
(AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-68U 561 13/8  
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

CHEMICAL MILLING (DEEP CONTOUR ETCHING). (U)

MAY 68 14P TARASOVA, V. A. I  
REPT. NO. FTD-HT-23-1225-67

UNCLASSIFIED REPORT

PORTIONS OF THIS DOCUMENT ARE ILLEGIBLE. SEE  
INTRODUCTION SECTION OF THIS ANNOUNCEMENT JOURNAL FOR CFST.  
ORDERING INSTRUCTIONS.

SUPPLEMENTARY NOTE: UNEDITED ROUGH DRAFT TRANS. OF MONO,  
SPRAVOCHNIK MASHINOSTROITEL'YA (REFERENCE BOOK FOR  
THE MECHANICAL ENGINEER) N.P., 1963 V5 BK. 1 P387-393,  
BY E. HARTER.

DESCRIPTORS: (+CHEMICAL MILLING, REVIEWS),  
INORGANIC ACIDS, CLEANING, MASKING, ETCHING,  
LIQUID IMMERSION TESTS, ALUMINUM ALLOYS, TITANIUM  
ALLOYS, STAINLESS STEEL, TABLES, POLYVINYL  
CHLORIDE, USSR

IDENTIFIERS: TRANSLATIONS

(U)  
(U)

FOR THE SHAPING OF PARTS, INSTEAD OF MECHANICAL  
REMOVING OF MATERIAL TO OBTAIN A GIVEN FORM THERE IS  
DESCRIBED A METHOD OF ETCHING THE MATERIAL AWAY WITH  
CHEMICALS. THERE ARE FOUR OPERATIONS INVOLVED IN  
THIS PROCESS. THE MATERIAL NOT TO BE REMOVED IS  
PROTECTED BY PAINTS AND VARNISHES, PREFERABLY  
CHLORINATED-POLYVINYL-CHLORIDE LACQUERS AND ENAMELS.  
ADHESIVE TAPES AND RUBBER ARE ALSO USED. THE  
SURFACE HAS TO BE PREPARED BEFOREHAND. NOT MORE  
THAN 24 HOURS SHOULD ELAPSE BETWEEN THE APPLYING OF  
THESE PROTECTIONS AND THE ETCHING WORK. WEAKENING  
AND WARPING IS AVOIDED BY USING CHEMICALS INSTEAD OF  
MACHINING. EXTENSIVE TABLES ARE ATTACHED GIVING  
DIRECTIONS FOR THE PREPARING AND APPLYING THE  
COATINGS TO PROTECT MATERIAL NOT TO BE REMOVED AND  
FOR REMOVING THE COATING AFTERWARDS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0ML6

AD#681 765 11/6  
GENERAL DYNAMICS/ASTRONAUTICS SAN DIEGO CALIF

A NEW APPROACH TO BEND TESTING FOR THE DETERMINATION  
OF HYDROGEN EMBRITTLEMENT SUSCEPTIBILITY OF SHEET  
MATERIALS. (U)

JUN 61 31P JONES, R. L. ;  
REPT. NO. GDA-MRG-235

UNCLASSIFIED REPORT

DESCRIPTORS: (\*METAL PLATES, HYDROGEN  
EMBRITTLEMENT), (\*HYDROGEN EMBRITTLEMENT, TEST  
METHODS), STEEL, BENDING, COMPRESSIVE  
PROPERTIES, CHEMICAL MILLING, ELECTROPLATING,  
CADMIUM, FAILURE(MECHANICS), DUCTILITY,  
STRESSES, HYDROGEN, DIFFUSION, STRESS  
RELIEVING (U)

IDENTIFIERS: STEEL 4340 (U)

A SERIES OF EXPERIMENTAL PROGRAMS WERE CARRIED OUT  
TO DETERMINE THE SUITABILITY AND SENSITIVITY OF A NEW  
TEST TECHNIQUE FOR THE DETERMINATION OF HYDROGEN  
EMBRITTLEMENT SUSCEPTIBILITY OF MATERIALS. A  
SIMPLE BEND TEST WAS USED TO STUDY THE EFFECT OF  
CHEMICAL MILLING AND CADMIUM PLATING ON HYDROGEN  
EMBRITTLEMENT OF HIGH STRENGTH 4340 STEEL SHEET.  
THE BEND TEST CONSISTED OF LOADING A COUPON IN THE  
FORM OF A SLENDER COLUMN IN COMPRESSION AT A SERIES  
OF FIXED BENDING SPEEDS. BEND DUCTILITY WAS  
MEASURED AS THE DEPRESSION OF COLUMN HEIGHT AT  
FRACTURE AND ALL DATA WERE REFERRED BACK TO A BASE  
LINE CONDITION (NON-EMBRITTLED) FOR COMPARISON.  
(AUTHOR) (U)

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DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-683 061 13/8 11/6  
BOEING CO RENTON WASH COMMERCIAL AIRPLANE DIV

DETERMINATION OF RESIDUAL STRESS PROFILES BY X-RAY DIFFRACTION AND STRAIN GAGE METHODS FOR BRAKE-PRESS FORMED Ti-6AL-4V.

(U)

DEC 68 41P ESQUIVEL, A. L. ;  
REPT. NO. D6-23737

UNCLASSIFIED REPORT

DESCRIPTORS: (\*TITANIUM ALLOYS, STRESSES),  
(\*NON-DESTRUCTIVE TESTING, TITANIUM ALLOYS), X-RAY DIFFRACTION ANALYSIS, STRAIN GAGES, COLD WORKING, STRESS RELIEVING, CHEMICAL MILLING, METAL-FORMING BRAKES

(U)

IDENTIFIERS: TITANIUM ALLOY 6AL 4V, \*RESIDUAL STRESS

(U)

THE RESIDUAL STRESS PROFILES (STRESS VERSUS DEPTH) FROM BRAKE-PRESS FORMED Ti-6AL-4V (ANNEALED) RIGHT ANGLE BENDS WERE DETERMINED BY THE TWO-EXPOSURE X-RAY DIFFRACTION METHOD AND A STRESS RELAXATION STRAIN GAGE METHOD USING EITHER CONTINUOUS OR STEPWISE (INCREMENTAL) CHEM-MILLING. RESULTS FROM THE STRAIN GAGE METHOD WERE TESTED ON FOUR AVAILABLE STRESS FORMULATIONS. THE HAIGH EQUATION (COMPUTER PROGRAM: NORS) WAS FOUND MOST SUITABLE AND IS RECOMMENDED FOR FUTURE USE. A REASONABLE CORRESPONDENCE WAS FOUND BETWEEN THE RESIDUAL STRESSES CALCULATED FROM X-RAY PEAK SHIFT DATA AND THOSE FROM STRAIN GAGE DATA. RESIDUAL STRESSES OBTAINED BY THE STRAIN GAGE METHOD UTILIZING CHEM-MILLING WERE FOUND REPRODUCIBLE TO WITHIN 3 TO 5 KSI. RESIDUAL STRESS PROFILES OF THE BRAKE-PRESS FORMED BENDS INDICATE COMPRESSIVE STRESS (~30 KSI) NEAR THE OUTSIDE BEND SURFACE AND TENSILE STRESSES (40 TO 50 KSI) ON THE INSIDE BEND SURFACE. DEPTH OF THE COMPRESSIVE STRESSES VARIED FROM 0.008 TO 0.012 INCH. NO SIGNIFICANT DIFFERENCES WERE FOUND BETWEEN THE RESIDUAL STRESS PROFILES OF BENDS 0.045-INCH THICK AND THOSE 0.050-INCH THICK. (AUTHOR)

(U)

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/ZOML6

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UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AU-725 614 13/8 5/2  
NAVAL MATERIAL INDUSTRIAL RESOURCES OFFICE PHILADELPHIA  
PA

NAVMIRO MANUFACTURING TECHNOLOGY BULLETIN  
NUMBERS 1 THRU 12, DECEMBER 1969-NOVEMBER  
1970.

(U)

NOV 70 79P

UNCLASSIFIED REPORT

DESCRIPTORS: (•MANUFACTURING METHODS, REVIEWS),  
MACHINE SHOP PRACTICE, PRECISION FINISHING,  
LASERS, POWDER METALLURGY, SINTERING, EXPLOSIVE  
FORMING, ULTRASONIC WELDING, COMPOSITE MATERIALS,  
CUTTING TOOLS, COOLING, CHEMICAL MILLING,  
ELECTRON BEAM MELTING, SPARK MACHINING, FORGING,  
NON-DESTRUCTIVE TESTING, CASTING  
IDENTIFIERS: COMPUTER AIDED DESIGN

(U)  
(U)

THE DOCUMENT IS A COMPILATION OF MANUFACTURING  
TECHNIQUES THAT CAN BE EMPLOYED IN VARIED INDUSTRIES (U)

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/ZOML6

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UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD-727 620 :3/8  
GRUMMAN AEROSPACE CORP BETHPAGE N Y

ADVANCED CHEMICAL MILLING PROCESSES.

(U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 1 JUL 69-31  
DEC 70.

MAR 71 213P STAEBLER,CHRISTIAN J., JR;  
CONTRACT: F33615-69-C-1840  
PROJ: AF-705-9  
MONITOR: AFML TK-71-44

UNCLASSIFIED REPORT

DESCRIPTORS: (\*CHEMICAL MILLING, \*TITANIUM  
ALLOYS), AUTOMATION, INORGANIC ACIDS, MASKING,  
ETCHING, HEAT TREATMENT, MECHANICAL WORKING, AIR  
POLLUTION

(U)

IDENTIFIERS: HYDROFLUORIC ACID

(U)

THE PROGRAM OBJECTIVE WAS TO IMPROVE THE  
CAPABILITY, RELIABILITY, AND COST EFFECTIVENESS OF  
CHEMICAL MILLING WHEN APPLIED TO SELECTED AEROSPACE  
STRUCTURAL MATERIALS. A COMPLETELY AUTOMATED,  
CENTRIFUGAL REGENERATION SYSTEM FOR TITANIUM  
HYDROFLUORIC ACID ETCHANT WAS DESIGNED, FABRICATED,  
AND TESTED. THIS SYSTEM AUTOMATICALLY ANALYZES THE  
ETCHANT, ADDS FRESH ACID, DETERMINES THE TITANIUM  
CONCENTRATION, AND ACTIVES A CENTRIFUGE WHICH REMOVES  
PRECIPITATED TITANIUM AND RECLAIMS THE ETCHANT. A  
NEW, STYRENE-BUTADIENE MASKANT WAS DEVELOPED THAT  
GIVES EXCELLENT LINE DEFINITION ON TITANIUM  
SUBSTRATES AND THAT CAN BE MANUFACTURED FOR ABOUT  
ONE-HALF THE COST OF COMMERCIALLY AVAILABLE MASKANTS.  
THE FEASIBILITY OF USING A LASER-DRILLED, HIGH-  
ENERGY WATER JET TO SCRIBE CHEM-MILLING MASKANTS WAS  
ESTABLISHED. OPTIMUM CHEM-MILLING/FORMING  
METHODIZING SEQUENCES WERE ESTABLISHED THAT MINIMIZE  
DISTORTION OF TITANIUM ALLOY DETAIL PARTS. SAMPLING  
AND ANALYTICAL TECHNIQUES WERE ESTABLISHED FOR THE  
MAJOR POLLUTANTS EMITTED BY CHEM-MILLING OPERATIONS.  
AIR POLLUTION CONTROL AGENCIES AND EQUIPMENT  
MANUFACTURERS WERE SURVEYED. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOML6

AD8738 271 13/8  
BATTELLE COLUMBUS LABS OHIO METALS AND CERAMICS  
INFORMATION CENTER

NONTRADITIONAL MACHINING OF BERYLLIUM,

(U)

JAN 72 91P GURKLIS, JOHN A. ;  
REPT. NO. MC1C-72-03

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: LIBRARY OF CONGRESS CATALOG CARD NO.  
78-190407.

DESCRIPTORS: (\*ELECTROEROSIVE MACHINING,  
BERYLLIUM), (\*CHEMICAL MILLING, BERYLLIUM),  
(\*BERYLLIUM, MACHINING), MACHINE TOOLS

(U)

IDENTIFIERS: \*ELECTROCHEMICAL MACHINING

(U)

THE REPORT DEALS WITH ELECTRICHEMICAL MACHINING  
(ECM), CHEMICAL MILLING, AND ELECTRIC-DISCHARGE  
MACHINING (EDM). THE GENERAL CHARACTERISTICS OF  
THESE PROCESSES AND THEIR APPLICATIONS TO THE  
PROCESSING OF BERYLLIUM PARTS ARE PRESENTED AND  
COVERED IN DETAIL.

(U)

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/ZOML6

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /Z0HL6

AD-87U 146 13/8 11/6 1/3  
METCUT RESEARCH ASSOCIATES INC CINCINNATI OHIO

SURFACE INTEGRITY OF MACHINED STRUCTURAL  
COMPONENTS.

(U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 1 FEB 68-30  
NOV 69.

MAR 70 361P KOSTER, WILLIAM P.; FIELD,  
MICHAEL JAHLES, JOHN F.; FRITZ, LOUIS J.;  
GATTO, LUCIANO R.  
REPT. NO. 970-11700  
CONTRACT: F33615-68-C-1003  
PROJ: AF-721-8  
MONITOR: AFML TR-70-11

UNCLASSIFIED REPORT

DESCRIPTORS: (\*AIRFRAMES, STRUCTURAL PARTS),  
(\*MATERIAL REMOVAL, EFFECTIVENESS), MILLING  
MACHINES, GRINDING, DRILLING, ELECTROLYTIC  
POLISHING, ELECTROEROSIVE MACHINING, CHEMICAL  
MILLING, MICROSTRUCTURE, MARTENSITE,  
DEFECTS(MATERIALS), SURFACE ROUGHNESS, STRESS  
CORROSION, FATIGUE(MECHANICS),  
AGING(MATERIALS)

(U)

IDENTIFIERS: NICKEL ALLOY INCONEL 718, TITANIUM  
ALLOY 6AL 4V, STEEL 4340, ELECTROCHEMICAL  
MACHINING, ELECTRICAL DISCHARGE MACHINING,  
CHEMICAL MACHINING

(U)

A PROGRAM HAS BEEN RUN TO EVALUATE THE EFFECTS OF  
DIFFERENT METAL REMOVAL METHODS AND VARIATIONS OF  
THESE METHODS ON SURFACE INTEGRITY. THREE ALLOYS  
WERE STUDIED: BETA ROLLED TI-6AL-4V; AISI  
4340, QUENCHED AND TEMPERED, 50 RC; AND INCONEL  
718, SOLUTION TREATED AND AGED. VARIOUS GRINDING  
PROCEDURES CAUSED THE TITANIUM ALLOY TO EXHIBIT A  
FATIGUE STRENGTH RANGE OF 13 TO 62 KSI, THE  
FATIGUE STRENGTH OF 4340 DUE TO GRINDING VARIABLES  
RANGED FROM 62 TO 102 KSI, WHILE INCONEL 718 SHOWED  
A RANGE OF 24 TO 60 KSI. ABUSIVE GRINDING  
CONDITIONS ALWAYS RESULTED IN FATIGUE STRENGTHS AT  
THE MINIMUM OF THESE RANGES. MILLING VARIABLES  
EXHIBITED A FATIGUE STRENGTH RANGE OF 32 TO 72 KSI IN  
THE BETA ROLLED TITANIUM ALLOY. EDM AND ECM ON  
INCONEL 718 YIELDED 22 AND 39 KSI, RESPECTIVELY,  
COMPARED TO 60 KSI FOR GENTLE GRINDING. GUIDELINES  
FOR PROCESSING AEROSPACE HARDWARE CONSIDERING SURFACE  
INTEGRITY REQUIREMENTS ARE PRESENTED IN THE REPORT. (U)

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/Z0HL6

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**CORPORATE AUTHOR - MONITORING AGENCY**

•AEROJET-GENERAL CORP SACRAMENTO  
CALIF

VOLUME IV.  
AD 264-685

STRUCTURAL TESTS OF A  
CHEMICALLY MILLED LADISH D-6AC  
STEEL SECOND-STAGE MINUTEMAN AF1  
CLOSURE  
AD-261 959

•AERONAUTICAL SYSTEMS DIV WRIGHT-  
PATTERSON AFB OHIO  
\* \* \*  
ASD-IR7 727  
500 C SILICON CARBIDE RECTIFIER  
PROGRAM.  
AD-420 275

ASD-IR7 865 V6  
SILICON SEMICONDUCTOR NETWORKS  
MANUFACTURING METHODS  
AD-291 600

ASD-TDR63 730  
THE DESIGN AND EVALUATION OF  
PERFORATED ION EMITTERS.  
AD-418 226

ASD-TR7 648 VI  
CHEMICAL COMPOUNDS FOR METAL  
SHAPING  
AD-271 536

ASD-TR7 648 V3  
CHEMICAL COMPOUNDS FOR METAL  
SHAPING  
AC-295 752

ASD-TR-61-350  
INVESTIGATION OF SINGLE-CRYSTAL  
AND POLYCRYSTALLINE TITANIUM  
DIBORIDE: METALLOGRAPHIC PROCEDURES  
AND FINDINGS  
AD-271 963

ASD-TR61 706 V2  
BERYLLIUM COMPOSITE STRUCTURES,  
VOLUME II. MATERIALS AND PROCESSES  
AD-278 526

ASD-TR617 576  
TITANIUM DEVELOPMENT PROGRAM

AERONCA MFG CORP MIDDLETON OHIO

6 0 0

TR61 706 V2  
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VOLUME II. MATERIALS AND PROCESSES  
(ASD-TR61 706 V2)  
AD-278 526

AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

ARL-65-111  
RESEARCH ON PHOTOVOLTAIC CELLS.  
AD-621 484

AIR FORCE CAMBRIDGE RESEARCH LABS L G  
HANSCOM FIELD MASS

729  
A NOTE ON SEMICONDUCTOR DEVICE  
FABRICATION  
AD-268 033

AFCLR-1111  
CHEMICAL COMPOUNDS FOR METAL  
SHAPING  
AD-282 920

**AIR FORCE MACHINABILITY DATA CENTER  
CINCINNATI OHIO**

AFMDC-66-2  
MACHINING DATA FOR BERYLLIUM  
METAL.  
AD-485 297

AIR FORCE MATERIALS LAB WRIGHT-PATTERSON AFB OHIO

AFNL-TR-70-11  
SURFACE INTEGRITY OF MACHINED  
STRUCTURAL COMPONENTS.  
AD-870 146

AFML-TR-71-44  
ADVANCED CHEMICAL MILLING  
PROCESSES.  
AD-727 620

O-1  
UNCLASSIFIED

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AIR-BAT

\*AIR FORCE OFFICE OF SCIENTIFIC  
RESEARCH ARLINGTON VA

\* \* \*

AFOSR-2-74

RESEARCH IN THE GENERAL FIELD  
OF SUBSTRUCTURE AND DISLOCATION  
NETWORKS IN METALLIC CRYSTALS.  
AD-610 424

\* \* \*

AFOSR-TR-71-2489

ULTRAVIOLET ABSORPTION SPECTRA  
OF TRANSITION METAL ATOMS IN RARE-  
GAS MATRICES,  
AD-730 290\*ALLOY ENGINEERING AND CASTING CO  
CHAMPAIGN ILL

\* \* \*

A FUNDAMENTAL STUDY OF ROLLING  
CONTACT FATIGUE  
AD-276 887

\* \* \*

A FUNDAMENTAL STUDY OF ROLLING  
CONTACT FATIGUE  
AD-285 045\*ARMY ELECTRONICS LABS FORT MONMOUTH N  
J

\* \* \*

TR2318  
DESIGN CONSIDERATIONS FOR  
MICROWAVE GERMANIUM TUNNEL DIODES  
AD-294 788

\* \* \*

TR-2339  
TECHNOLOGY FOR PNP PLANAR  
SILICON TRANSISTORS: SWITCHING AND  
AMPLIFYING,  
AD-408 190\*ARMY MATERIALS RESEARCH AGENCY  
WATERTOWN MASS

\* \* \*

AMRA-TR-64-4;  
THE METALLOGRAPHY OF PYROLYTIC  
GRAPHITE,  
AD-612 643\*ARMY MISSILE COMMAND REDSTONE  
ARSENAL ALA ARMY INERTIAL  
GUIDANCE AND CONTROL LAB AND CENTER

\* \* \*

RG-TR-62-20

MISSILE-BORNE TRACKING ANTENNA,  
12-426 922\*BATTELLE COLUMBUS LABS OHIO METALS  
AND CERAMICS INFORMATION CENTER

\* \* \*

MCIC-72-03

NONTRADITIONAL MACHINING OF  
BERYLLIUM,  
AD-738 271

## \*BATTELLE MEMORIAL INST COLUMBUS OHIO

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MACHINING AND GRINDING OF  
NICKEL-AND COBALT-BASE ALLOYS,  
(NASA-TM-X-52446)

AD-624 075

\* \* \*

MACHINING AND GRINDING OF  
ULTRAHIGH-STRENGTH STEELS AND  
STAINLESS STEEL ALLOYS,  
(NASA-TM-X-52423)

AD-639 654

## \*BATTELLE MEMORIAL INST COLUMBUS OHIO

\* \* \*

MACHINING AND GRINDING OF  
TITANIUM AND ITS ALLOYS.  
(NASA-TM-X-52312)

AD-610 508

\*BATTELLE MEMORIAL INST COLUMBUS OHIO  
DEFENSE METALS INFORMATION CENTER

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A SURVEY OF THE COMPARATIVE  
COSTS OF FABRICATING AIRFRAME FROM  
ALUMINUM AND FROM TITANIUM,  
AD-609 349

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DMIC-213  
METAL REMOVAL BY  
ELECTROCHEMICAL METHODS AND ITS  
EFFECTS ON MECHANICAL PROPERTIES OF  
METALS,  
AD-613 261

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DMIC-MEMO-237  
A REVIEW OF METALLOGRAPHIC  
PREPARATION PROCEDURES FOR0-2  
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BERYLLIUM AND BERYLLIUM ALLOYS,  
AD-674 066

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M144  
A REVIEW OF RECENT DEVELOPMENTS  
IN TITANIUM AND TITANIUM ALLOY  
TECHNOLOGY

AD-269 209

\*BELL TELEPHONE LABS INC WHIPPS N J

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12  
ENGINEERING SERVICES ON  
TRANSISTORS.

AD-422 492

\*BOEING CO RENTON WASH COMMERCIAL  
AIRPLANE DIV

\*\*\*

D6-23737  
DETERMINATION OF RESIDUAL  
STRESS PROFILES BY X-RAY  
DIFFRACTION AND STRAIN GAGE METHODS  
FOR BRAKE-PRESS FORMED Ti-BAL-4V;  
AD-683 041

\*BOEING CO WICHITA KANS WICHITA DIV

\*\*\*

BOEING-WICHITA MATERIALS AND  
RESEARCH DEVELOPMENT PROGRAMS, 1957-  
1961  
AD-271 167

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\*CRYSTALONICS INC CAMBRIDGE MASS

\*\*\*

PRODUCTION ENGINEERING MEASURE  
TO IMPROVE PRODUCTION TECHNIQUES  
AND TO INSURE THE RELIABILITY OF  
THE C600 SERIES FIELD EFFECT  
TRANSISTORS.  
AD-426 356

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PRODUCTION ENGINEERING MEASURE  
TO IMPROVE PRODUCTION TECHNIQUES  
AND TO INSURE THE RELIABILITY OF  
THE C600 SERIES FIELD EFFECT  
TRANSISTORS.  
AD-606 477

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PRODUCTION ENGINEERING MEASURE  
TO IMPROVE PRODUCTION TECHNIQUES  
AND TO INSURE THE RELIABILITY OF  
THE C600 SERIES FIELD EFFECT  
TRANSISTORS.  
AD-613 068

\*DOUGLAS AIRCRAFT CO INC LONG BEACH  
CALIF

\*\*\*

CHEMICAL COMPOUNDS FOR METAL  
SHAPING  
(ASD-TR7 643 V1)  
AD-271 526

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1111  
CHEMICAL COMPOUNDS FOR METAL  
SHAPING  
(AFCRL-1111)  
AD-282 920

\*\*\*

TR7 648 V3  
CHEMICAL COMPOUNDS FOR METAL  
SHAPING  
(ASD-TR7 648 V3)  
AD-295 752

\*ESTABLISHMENT MALVERN (ENGLAND)

\*\*\*

RSIC-409  
MACHINING AND GRINDING OF  
TITANIUM AND ITS ALLOYS.  
AD-620 508

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RSIC-482  
MACHINING AND GRINDING OF  
NICKEL-AND COBALT-BASE ALLOYS.  
AD-634 075

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RSIC-501  
MACHINING AND GRINDING OF  
ULTRAHIGH-STRENGTH STEELS AND  
STAINLESS STEEL ALLOYS.  
AD-639 654

J-3

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FOR-GEN

• FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

• • •  
ELECTRIC AND CHEMICO-MECHANICAL METHODS OF WORKING METALS (CHAPTER VIII)  
AD-265 701

• • •  
FTD-HT-23-1225-67  
CHEMICAL MILLING (DEEP CONTOUR ETCHING),  
AD-680 561

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FTD-TT-65-805  
CHEMICAL MILLING,  
(TT-65-62694)  
AD-618 628

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FTD-TT-65-1539  
SECONDARY ELECTRONIC EMISSION OF COPPER AND OF CERTAIN COATINGS,  
(TT-66-61136)  
AD-631 855

• FRANKLIN INST PHILADELPHIA PA LABS FOR RESEARCH AND DEVELOPMENT

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F-A2400  
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(AFOSR-2574)  
AD-610 434

• GENERAL DYNAMICS/ASTRONAUTICS SAN DIEGO CALIF

• • •  
GDA-AN61AMR4062  
STRIPPING PT201 THERMOSETTING RESIN COATINGS FROM 321 ANNEALED STAINLESS STEEL SURFACES,  
(PROPELLANT UTILIZATION MANOMETER HOUSINGS),  
AD-677 494

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GDA-MRG-235  
A NEW APPROACH TO BEND TESTING FOR THE DETERMINATION OF HYDROGEN FMBRITMENT SUSCEPTIBILITY OF SHEET MATERIALS.  
AD-681 765

• GENERAL DYNAMICS/CONVAIR SAN DIEGO CALIF

• • •  
TITANIUM DEVELOPMENT PROGRAM,  
VOLUME IV.  
(ASD-TR617 576)  
AD-264 685

• • •  
GDC-PR919  
REDUCING HAD STRAIGHTENING BY CHEM-MILLING 7075 AND 7178 ALUMINUM ALLOY IN THE 'H' (OR NATURALLY AGED) CONDITION.  
AD-677 066

• • •  
GDC-PR-920  
CHEM-MILL PROCESS FOR CONTOURING ALUMINUM HONEYCOMB CORE.  
AD-678 154

• GENERAL DYNAMICS/FORT WORTH TX

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ERI FW125  
DEVELOPMENT OF CHEMICAL MILLED WAFFLE GRID BERYLLIUM STRUCTURAL PANEL,  
AD-423 282

• • •  
FGT 2100  
WING - ALUMINUM SHEET AND PLATE - DYNAMIC ETCHED OR CHEM-MILLED - MECHANICAL PROPERTIES - DETERMINATION OF  
AD-286 074

• • •  
FGT 2510  
MATERIALS - HONEYCOMB CORE RIBBON RELATIONSHIP BETWEEN FLOW CHARACTERISTICS OF BRAZING ALLOY AND OXIDE FILM FORMATIONS OF - DETERMINATION OF  
AD-272 227

• • •  
FTDM 2060  
MATERIAL BERYLLIUM WAFFLE PANEL. CHEMICAL MILLED, SHEAR TEST OF,  
AD-438 138

• GENERAL DYNAMICS/POMONA CALIF

## UNCLASSIFIED

GEN-LEA

8926 142  
EFFECT OF SURFACE FINISHES ON  
FATIGUE LIFE  
AD-402 164

•GENERAL ELECTRIC CO IRMC S C  
" " SOLID ELECTROLYTE TANTALUM FOIL  
CAPACITOR.  
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RESISTIVE AND CONDUCTIVE PARTS MADE  
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